BULLETIN

OF

THE NEW YORK BOTANICAL GARDEN

[ISSUED FEBRUARY 13, 1906]

CONTENTS:

Nos. 13 and 14, completing vol. 4 of this BULLETIN, have not yet been published.

BULLETIN

OF

The New York Botanical Garden

VOLUME V

WITH 17 PLATES

1906–1908

PUBLISHED FOR THE GARDEN

AT 41 NORTH QUEEN STREET, LANCASTER, PA
BY THE NEW ERA PRINTING COMPANY

BULLETIN

OF

The New York Botanical Garden

Vol. 5. No. 15.

REPORT OF THE SECRETARY AND DIRECTOR-IN-CHIEF FOR THE YEAR 1905

(*Accepted and ordered printed January 9, 1906*)

To the Board of Managers of the New York Botanical Garden.

Gentlemen: I have the honor to submit herewith my report as Secretary and Director-in-Chief for the year ending January 8, 1906.

Continued progress has been made throughout the past year in carrying out the general plan for the construction of garden and park, and the collections in all departments have been materially increased. The permanent funds have been increased about $4,500. The total membership is now 1,129, an increase during the year of 21. Contributions of money by many friends of the Garden have been used to secure important additions to the collections which would not have been possible with our ordinary income, and gifts of specimens, books and plants have also increased the collections in a very satisfactory manner. General construction work, including roads, paths, bridges, grading, waterpipes, additional furniture, and slight modifications to buildings, have been carried on by means of a city appropriation of $50,000 which became available in the spring, and a second city appropriation of $20,000 made available in December. The city has also increased the general maintenance allowance from $70,000 for 1905 to $80,000 for 1906; this will be a great help in the proper care of the grounds, buildings and collections,

but it is not sufficient for the most satisfactory results in the present stage of development of the institution.

Building of Roads and Paths

The main park driveways from the museum building and the Bronx Park Station of the New York Central Railroad north to the Williamsbridge end of the Garden have been entirely completed and thrown open for use; the portion from the plaza just north of the lakes easterly across the Bronx River to the plaza near the stable have been completely graded and the telford foundation of more than one half of it laid down; the portion from the Williamsbridge entrance southerly along the east side of the Bronx River has been completely graded and about one half of the telford foundation laid; work on continuing the telford foundation of both these roads is progressing during the winter, the necessary stone being obtained from grading operations along the sides of the roads and in the rear of the museum building, and by breaking up old stone walls in the eastern part of the grounds, and it is expected that both these roads will be finally completed and thrown open for use during the coming season.

The rubble-stone masonry retaining walls at the Mosholu Parkway approach have been completed under the Park Department contract, and part of the earth filling has been put in; the completion of this filling may be accomplished during the winter and early spring, so that this important parkway connection can be finished by the time that the Park Department completes the driveway at the adjacent end of the Mosholu Parkway. The completion of these short stretches of road will furnish a continuous driveway through park lands from Spuyten Duyvil through Van Cortlandt Park, the Mosholu Parkway, Bronx Park, the Bronx and Pelham Parkway and Pelham Bay Park to New Rochelle; inasmuch as the roads of the Garden lie almost central to this completed system, it is certain that the travel over them will be vastly increased as soon as the connections are made.

The retaining walls for the Woodlawn Road approach,

and the flight of cut stone steps for the path approach at that point are almost completed, under the same Park Department contract as that which provided the walls at the Mosholu Parkway approach; most of the filling required for the roadway at this Woodlawn Road approach has been put in place under the provisions of the same contract, but considerably more is needed to properly shape the banks; this may be supplied as soon as the contractor completes his work according to specifications, which should not be delayed beyond March 1, and it is expected that this very deep filling will have settled down so that the driveway may be laid upon it during the year.

We can therefore apparently look forward to the completion during the year 1906 of the entire driveway system planned for the Garden, except the portion about twelve hundred feet long extending from the plaza near the stable southward to the southeastern corner of the grounds, which it is useless to build until the Bronx Boulevard, planned to bound the Garden to the east, shall have been constructed, for no entrance at this southeastern corner can be properly established until that street is built.

The extension of the path system has gone forward at points west and north of the museum building, it being sought to connect the Mosholu Parkway approach with the approach at Woodlawn Road, and the bridges east of the museum building with each other and with these approaches; also at points southeast of the museum building and east of the herbaceous grounds; but much work still remains to be done before the path system can near completion, though about one half of the length of path originally planned has now been finished; after road-building operations are over the path system can be pushed more rapidly to completion.

It has become apparent to me after watching the distribution of visitors along the paths already constructed that it will in the end be desirable to supply a considerable length of path additional to that originally planned, in order to lead to additional points of interest; it is probably best to essentially

carry out the original plan before considering these proposed additions, but I may bring some suggestions to your attention during the year.

The regulating and grading of the Southern Boulevard between the south gate and Pelham Avenue, done by the Department of Highways during the year, has necessitated a change of grade of a few inches where this street meets the Garden driveway. A temporary filling has been made at the south gate in order to partially meet the new grade, but the permanent roadway at this point cannot well be readjusted until the Southern Boulevard is paved.

Bridges

The long five-arched rubble-stone bridge carrying the driveway across the valley of the Bronx River north of the hemlock grove, on which work was begun in 1904, under a Park Department contract, was completed in the summer in a most satisfactory manner by Mr. M. J. Leahy, the contractor. We at once began the work of filling earth in between and over the arches, and of making the necessary earth fillings at the two ends of this bridge, and completed this work in December, leaving the driveway subgraded and ready to receive its telford foundation during the winter and spring. The curbstones separating the driveway from the sidewalks at this bridge have been hauled in place and may be set in the spring after the earth filling has settled down. Ashes from the power house are being hauled this winter to form the foundations of the two sidewalks.

The one-arched cut granite bridge carrying the driveway across the valley of the lakes northeast of the museum building was completed during the year under a Park Department contract with Joseph Gallo. The work is satisfactory except for a leak under the north abutment which prevents at present raising the upper lake to its established level. The contractor claimed that it was not in his contract to remedy this defect, but an inquiry by the Hon. Henry C. Schrader, Commissioner of Parks, of the Corporation Counsel, brought out an opinion that the contractor may be obliged to stop the leak.

These two bridges together with the one built two years ago across the Bronx River at the northern end of the Garden provide all the driveway bridges called for in the general plan of the Garden. The general plan provides for two foot bridges, not yet built, one to replace the present wooden "Blue Bridge" at the north end of the hemlock grove, plans for which are submitted to you herewith, and another foot bridge to cross the Bronx River at a point where the fruticetum plain joins the north meadows; this is not required at present, however. The "Blue Bridge" ought to be rebuilt this year, as it is doubtfully safe on account of its age and requires rather heavy maintenance charges to keep it in order.

Grading

The excavating of rock along the path just northeast of the public conservatories required in establishing the contour of the ground called for by the general plan was completed early in the year and the necessary earth filling made at this point; this was allowed to settle during the summer and the whole area topsoiled and sown during the autumn, thus completing the finished surfaces in that part of the grounds.

Excavation of rock and earth at the rear of the museum building made necessary in establishing the contour of the grounds called for by the general plan has been prosecuted at intervals during the year and much progress has been made. The material excavated has been used for filling at the bridges and for the telford foundation of driveways and paths, for filling against the railway at the western end of the valley of the lakes and for the filling between the retaining walls at the Mosholu Parkway which is still going forward. These excavations are in capital condition to be continued during the winter.

Much grading has also been done along the sides of the driveways under construction east of the Bronx River, and little now remains to be done there.

The dirt embankment left by the contractor who built the temporary construction railroad for the Jerome Park Reser-

voir through the grounds in 1896, has been completely removed and used for filling at the east end of the long bridge and along the driveway east of the Bronx River. The valley which it occupied may now be restored to its natural contour by a coating of topsoil, after which the only indications that this temporary railroad existed will be noticed in the swathe cut through the woods where the trestle crossed the river; this gap has, however, been planted with rapid growing trees during the autumn, which should essentially close it within a few years.

Drainage

The operations of the past year have included very little addition to the drainage system, this having been previously essentially completed in the areas where work has been going on. Considerable still remains to be done in the northern parts of the grounds, and east of the Bronx River, which may conveniently be taken up from time to time.

Water Supply

The completion of the finished surfaces along the path northeast of the public conservatories made it possible to complete the water pipe circuit around these buildings, and sufficient four-inch cast-iron pipe to do this was put in during the autumn, together with hose taps for irrigation.

The building of the bridge across the valley of the lakes made it possible to extend the main six-inch water supply northward along the west side of the main driveway for about five-hundred feet, which was also accomplished in the autumn, and a hydrant set at the high point on this line.

The details of all this construction work on roads, paths, bridges, grading operations, drainage and water supply will be found in the report of the Superintendent of Grounds, hereto appended.

Buildings

No new buildings have been constructed during the year.

Accounts of their maintenance, the placing of additional furniture and other details, will be found in the report of

the Assistant Director and in that of the Superintendent of Grounds, hereto appended.

The bronze fountain in front of the museum building was successfully completed and mounted early in July.

The Hemlock Grove

The increasing number of visitors makes it now very desirable that some restriction of the use of this natural woodland should be required. It has already been found necessary to increase the patrol of this tract to guard against fires set by thoughtless persons, and other destructive tendencies. Hitherto no attempt has been made to prevent the indiscriminate trampling of the floor of this forest, but inasmuch as this dangerous process will evidently rapidly increase unless restricted, it is now recommended that means be taken to confine pedestrianism to well defined paths and trails, and that the coöperation of the Commissioner of Parks be requested in order that this may be carried out. I think it rather certain that simple notices requiring visitors to keep to the paths and trails will not be sufficient, though it is perhaps best to experiment with this method before going further, and if it is not effective, some railing or fencing should be constructed.

Plants and Planting

Complete details of the gardening operations are furnished in the report of the Head Gardener hereto appended.

Work has been concentrated during the past year on the more critical study, grouping, and labeling of the collections, and no special attempt has been made to increase the number of species grown, this number being indeed five or six hundred less than reported for 1904, the present number of species available for observation and study being about 11,423.

The areas of finished lawns and banks have been materially increased as construction work has proceeded.

A site for the additional public conservatories has been agreed upon by the Board of Managers and by the Commissioner of Parks of the Borough of the Bronx, and plans for

these buildings are being prepared in accordance with authority already granted me. The site selected is near the eastern border of the grounds about 500 feet north of the Bleecker Street entrance, where an essentially level tract of land provides a capital situation for them, and where the natural contour permits their ready approach by a driveway connecting with the main driveway west of this entrance. It is believed that the plans for these buildings may be so far perfected during the year as to make it practicable to commence work upon them in case an appropriation for this purpose is granted by the city.

Library

The growth of the library during the past year has been very satisfactory and the collection of books is rapidly becoming one of the most complete of its kind. A report of the Librarian hereto appended shows that 1,872 volumes and many pamphlets have been added, the total number of bound volumes now aggregating 17,629.

In pursuance of authority granted me, a special effort has been made to secure works of the older authors published between the years 1700 and 1870. In carrying out this authorization, I have made an arrangement with the firm of H. Georg & Co., of Geneva, Switzerland, book dealers and antiquarians, to purchase on our account all botanical works of this period not already in the library, as rapidly as they come into the market, and transmit them to us in parcels from time to time; a complete list of the works of this period already in the library is in the hands of this firm, so that duplication is avoided. This action is in pursuance of the recommendation made by me in my report for 1904, and if carried out for several years should go far toward completing the collection, though there are a good many books now obtainable only by a fortunate chance, and some important treatises can only be had either by reprinting from copies in Old World libraries, or by photographic reproduction, a process which is now interesting librarians throughout the country.

This movement has been made possible by gifts of money

from friends of the Garden, credited to the Special Book Fund as follows:

Andrew Carnegie	$ 500.00
D. O. Mills	500.00
John Innes Kane	500.00
Mortimer L. Schiff	250.00
S. W. Fairchild	100.00
Louis Marshall	100.00
H. C. von Post	100.00
Mrs. Wm. Bryce	50.00
James J. Goodwin	50.00
T. G. Sellew	25.00
	$2,175.00

The necessity of providing additional shelving in the library referred to in my report for 1904 was met during the year by the construction of additional steel shelves providing space for between 4,000 and 5,000 volumes, and this will accommodate the growth of the library for a considerable period. By moving the stacks somewhat closer together and closer to the walls, this additional shelving was installed on one level. The next time it becomes desirable to supply additional shelving, will necessitate either constructing stacks above those now in place, as contemplated in the original plans for the building, or obtaining additional space in one of the rooms adjacent to the library.

The value of our publications as exchange media is becoming increasingly apparent in the demand for them by other publishing institutions, so that a large portion of our expenditure for printing is met by the value of publications received in exchange; the policy of printing large editions of our publications, pursued from the first, is thus strengthened.

Museums and Herbarium

The reports of the Curator of Museums and Herbarium and of the Honorary Curator of the Economic Collections record the progress made during the year in obtaining and installing specimens. As in the case of the collections of

living plants, attention has been principally directed to the more accurate and critical study and arrangement of the collections already formed rather than to their increase, and satisfactory progress has been made along these lines. The total additions aggregate 52,732 specimens, some 36,000 of which were obtained through our own system of exploration, the continuance and expansion of which are undoubtedly the most satisfactory ways of increasing the collections in the future.

The cases in the public museums are now of just about enough capacity to properly display the specimens installed without crowding; the further natural growth of the collection should soon be provided for by additional cases, which another city appropriation for construction would make possible.

The increase of the herbarium was provided for by the construction of several cases, and several more are at present needed.

Laboratories

More use of the laboratories has been made by students pursuing original investigations under the direction of members of the staff than in any previous year, the number of such research students aggregating 53 and coming from 45 different institutions throughout the country. The report of the Assistant Director hereto appended presents details of this work.

Lectures and Demonstration

The Saturday afternoon lectures in spring and autumn were continued to increasing audiences.

Under authority already granted me, it became possible in the spring to organize a series of lectures and accompanying demonstrations for the pupils and teachers of the public schools of the Bronx, supplementing and illustrating the nature study work of grade 4 B of the schools; 9 lectures were delivered between April 14 and May 23 to about 2,300 different children and teachers. This work was again taken up in the autumn and 15 lectures and accompanying demon-

strations were delivered to over 4,000 children and teachers of grades 4 B and 5 B, between October 17 and December 12. This coöperation with the Department of Education was organized directly through Dr. A. T. Schauffler, District Superintendent of Schools, with the assistance of the school principals, and has been warmly welcomed by officials of the Board of Education. Up to the present time it has not been extended beyond the Borough of the Bronx, although the experiment was made of bringing about one hundred children from the lower east side of Manhattan to one of the lectures; it is believed that if the system could be extended to Manhattan, it would be of great additional value to the city, and I recommend that, in case this should appear practicable to the Board of Education, authority be given me to provide the additional lectures and demonstrations which would be required.

There is a continuously increasing demand by schools and other organizations for the services of demonstrators to accompany parties both of children and adults through the grounds and buildings, and this has been met as far as possible with the force at command by detailing junior assistants in the several departments for the purpose. The elaboration of this work would greatly increase the teaching value of the collections, though this would necessitate the employment of more assistance than is possible at present; it might, with time, go so far as to arrange to announce publicly that guides would be supplied to parties applying for them between certain hours. Mr. Skinner, the foreman at the public conservatories, gives a great deal of his time to this kind of service and it is highly appreciated by visitors, but it is, of course, a draft on time which is needed for the care and oversight of the collections.

Exploration

The importance of the exploration of little known parts of the world for the purpose of obtaining additions to the collections of all kinds, either by members of the staff or by special agents acquainted with the needs of the collections,

has already been mentioned, and there is no practicable limit to the aid to be secured by the continuation and expansion of this method of obtaining material. It has been made possible during the year by appropriations from the general fund of the Garden and also by gifts of money from the following persons credited to our exploration fund:

J. Pierpont Morgan	$ 500.00
James B. Ford	250.00
James Speyer	250.00
Geo. W. Perkins	200.00
G. S. Bowdoin	200.00
Samuel Thorne	100.00
Lowell M. Palmer	100.00
Isaac N. Seligman	100.00
Charles Lanier	100.00
Louis C. Tiffany	100.00
Robert W. de Forest	100.00
N. L. Britton	100.00
W. Bayard Cutting	100.00
Henry Graves	50.00
Samuel N. Hoyt	50.00
Samuel Sloan	50.00
J. E. Parsons	50.00
Edgar L. Marston	50.00
Addison Brown	50.00
James A. Scrymser	50.00
H. W. de Forest	25.00
	$2,575.00

Reports of the several expeditions sent out during the year have already been printed in the JOURNAL. They include the continuation of collecting in the Philippine Islands by Mr. R. S. Williams, special agent, who returned to the Garden in November; the continuation of the exploration of the Bahamian Islands, carried on by Dr. Marshall A. Howe, Assistant Curator, Dr. C. F. Millspaugh of the Field Columbian Museum of Chicago, Mrs. Britton and myself during parts of January, February and March; the work of Mr. John F. Cowell, Director of the Buffalo Botanic Garden,

in Panama during March; the exploration of parts of Arizona, Sonora, California, and Lower California, by Dr. D. T. MacDougal, Assistant Director, in March and April; the visit of Dr. W. A. Murrill, Assistant Curator, to Cuba in March, with the special object of the study of fungi in co-operation with Professor F. S. Earle, Director of the Cuban Agricultural Experiment Station; the exploration of Bermuda by myself, accompanied by Mrs. Britton and by Mr. Stewardson Brown of the Academy of Natural Sciences of Philadelphia, carried out during September; the examination of the western end of the Great Bahama Island by Mr. L. J. K. Brace, special agent, during May; the work of Dr. J. N. Rose, of the U. S. National Museum, in South Mexico, with the special object of increasing our knowledge of cactuses; the further exploration of the Island of Haiti by Mr. Geo. V. Nash, assisted by Mr. Norman Taylor, during July and August; the exploration of little known parts of the state of Utah, conducted by Dr. P. A. Rydberg, Assistant Curator, in June, July and August; the work of Dr. W. A. Murrill, Assistant Curator, in the study of fungi in Maine, with Mr. P. L. Ricker of the U. S. Department of Agriculture, and the continuation of the Bahamian exploration during December on Fortune Island and adjacent islands, by Mr. L. J. K. Brace, which is still in progress.

It will be seen that more attention has been given to the West Indies than to any other region during the year, and the value of the material secured from there makes it evident that operations in this field may well be continued at every available opportunity.

Investigations

The study of the collections has gone forward by members of the staff and assistants, and by fifty-three registered students, as well as by many visitors from other gardens and museums and from colleges or other educational institutions. The record of work accomplished will be found in the reports of the several officers, and that of students is given in detail in the report of the Assistant Director. The appropriation for the

expense of visiting other institutions enabled me to study botanical gardens and museums in Europe in the course of my trip to Vienna in July as a delegate to the Second International Congress of Botany, and other members of the staff have visited a number of American institutions for special purposes.

Research Scholarships

Mr. C. B. Robinson, a graduate student of Columbia University, was granted a research scholarship for five months to aid in the continuation of his studies on the stone-worts (Characeae) commenced last year; it is hoped that he will be able to complete this monograph during the spring of 1906.

Professor R. H. Pond, of Northwestern University, held a scholarship for two months while engaged in a physiological investigation of monocotyledonous plants under the direction of Dr. MacDougal.

Dr. E. J. Durand, Instructor in Botany in Cornell University, was awarded a scholarship for the month of September for the purpose of studying the important collection of fungi of the class Pyrenomycetes, purchased by me from Mr. George Massee of the Royal Gardens at Kew, England, together with our previous collections of these plants, and his studies have increased the reference value of these collections.

Mr. L. R. Abrams held a scholarship for two months while completing the study of the large and important collection made by him during the past three years on behalf of the Garden in southern California, and at the same time rendered valuable aid in determining specimens of previous collectors in that region. At the expiration of his scholarship he was appointed an Assistant Curator in the botanical department of the National Museum at Washington.

Mr. W. R. Maxon, an Assistant Curator of the National Museum, spent the month of November with Professor Underwood in their coöperative study of the ferns of tropical America, in the course of which the value of the fern collection was much increased.

Preservation of Native Plants

Part of the income of the fund of $3,000 established by the Misses Caroline and Olivia E. Phelps Stokes for the preservation of native plants has been expended in the printing of circulars, and part in the payment of prizes for essays. It is already apparent that greater attention is being paid to the care of natural woodlands than previously, and there is no doubt that the existence of this fund and the expenditure of its income are having a good effect.

Administrative

The resignation of Dr. D. T. MacDougal as Assistant Director to accept the position of Director of Botanical Research in the Carnegie Institution of Washington, has made a reorganization of the administrative work necessary. During the year I gradually increased the duties of Mr. Percy Wilson, Administrative Assistant, under the policy advocated by the Scientific Directors of relieving me of as much detailed executive work as should prove to be practicable, and under the further advice of the Scientific Directors, I have appointed Dr. William A. Murrill as First Assistant, to take general charge of the Garden at times when I should be absent.

Reports Appended

I submit also reports by the Assistant Director, the Curator of the Museums and Herbarium, the Curator of the Economic Collections, the Librarian, the Head Gardener, the Superintendent of Buildings and Grounds, and a schedule of expenditures under appropriations made by the Board of Managers.

Respectfully submitted,

N. L. Britton,

Director-in-Chief.

REPORT OF THE ASSISTANT DIRECTOR

Dr. N. L. Britton, Director-in-Chief.

Sir: I have the honor to present the following report for the year ending January 1, 1906.

Roads, Paths and Grounds

The roads and paths of the Garden have been kept in order by employees of the Department of Parks in accordance with the act of organization of the Garden. The efforts of this force are devoted to removing refuse, and to restoring the surfaces by the application of screenings when necessary. The obligation of the Department of Parks in this matter is set forth in an opinion by the Corporation Counsel published in the Journal for December, 1905.

The lawns, terraces, plantations and borders have been mowed, rolled, cultivated and kept in order by laborers and gardeners, as detailed in the reports of the Head Gardener and Superintendent. The force of gardeners and laborers available for this purpose is quite inadequate, and must be increased if the grounds and plantations are to be kept in fair condition.

The increasing number of visitors also demands some plan for the protection of the humus in the hemlock forest. It has already become necessary to prevent lounging on the grass plots on the areas west of the forest around the museum and conservatories. Additional guard service for the conservatory court and plaza, for the north meadows and the arboretum has been provided.

It is with great gratification that I am able to report that no notable damage to any of the collections has occurred during the year.

The deposition of newspapers and other rubbish in the grounds has made necessary the employment of two men whose principal duty is the removal of such material. Perhaps an effectual method of dealing with this nuisance is to be found in a stringent application of police regulations.

The Museum

No important repairs or alterations have been made in the museum during the year. The amount of shelving in the publication room has been doubled by the construction of new wooden stacks. Two masons have been employed in pointing up the cornices and balustrades and relaying tiles on the roof during the summer.

Some new cases for the better accommodation of the collections have been constructed, and a number of extensions to the present stacks have been installed in the library.

The interiors of the laboratories were painted with white lead and zinc, also the main corridor and the office of the assistant director.

It has been impossible so far to find and stop all the leaks, which cause some annoyance and damage in the various laboratories, and it will be necessary to devote more serious attention to this matter.

The new fountain in front of the museum was put in action in July and has operated satisfactorily. The water supply for it was cut off early in November.

Conservatories

The conservatories have been operated through the year with a few minor repairs to ventilating apparatus, doors, and shades. A very small amount of breakage has been reported. Two painters were employed from June to October in repainting the entire exterior of the range. The proper adjustment and management of the removable houses in the lily tanks has not yet been found, and some further experimentation may be necessary to get the best results.

Propagating Houses

The propagating houses have been maintained at a minimum of expense, and I am able to report that they and the nursery are in a very efficient condition.

Power Plant

The heating and power plant has been kept in good order. It was found necessary to relay the tiles on a portion of the roof. The three boilers were lined up and new grate bars and frames put in during the summer. No serious breaks in steam-pipes occurred during the year. The asbestos covering of a large section of the main to the conservatories was replaced in October. The low temperatures during January–April furnished a severe test of the efficiency of the entire plant. It is now necessary to run the full complement of boilers in the coldest weather.

Stable

No changes have been made in the stables except to enclose a small area adjoining and to the west with a picket fence for the storage of carts and apparatus.

Repair Shop

Simple repairs of all kinds, including sharpening of drills and axes and adjustment of implements, have been carried on by one man with great economy.

Carpenter Shop

Two carpenters are employed throughout the year, and are kept busy in the construction of cases for the museum, tubs for plants, and the numerous repairs on doors, furniture and wooden fittings, in addition to the construction of rustic park seats to be placed at various points in the Garden.

Publications

The JOURNAL has been published monthly during the year. The completed volume contains 224 pages with 30 plates and 40 figures. This publication is devoted to a current account of the various activities of the Garden, including non-technical descriptions of scientific results obtained, organization, and additions to the collections and exhibits, progress of construction within the grounds, accessions of all kinds

and accounts of the explorations which are now being prosecuted so vigorously.

BULLETIN No. 11, issued April 14, 1905, comprises 175 pages with 7 figures and 22 plates, completing Vol. III. The papers included have been published separately in advance. The first, Mycological Studies, II, by Professor F. S. Earle, was issued June 30, 1904; the second, The Comparative Embryology of the Cucurbitaceae, by J. E. Kirkwood, was issued October 7, 1904; the third, Additions to the Palaeobotany of the Cretaceous Formation of Long Island, No. II, by Dr. Arthur Hollick, was issued December 10, 1904; Additions to the Flora of Sub-tropical Florida, by J. K. Small, was issued January 27, 1905; and Contributions to the Flora of the Bahama Islands, I, by Dr. N. L. Britton, February 7, 1905. The table of contents and index to Vol. III were issued with this number.

BULLETIN No. 12, containing the reports of the Director-in-Chief, Assistant Director, Curator of the Museums and Herbarium, Honorory Curator of the Economic Collections, Librarian, Head Gardener, Superintendent of Buildings and Grounds, Scientific Directors, Committee on patrons, fellows and members, and Treasurer, was issued May 8, 1905. This number is the first of Vol. IV and contains 113 pages.

Of BULLETIN No. 13, a single paper, Contributions to the Flora of the Bahama Islands, II, by Dr. N. L. Britton, was issued separately in advance, August 24, 1905.

CONTRIBUTIONS as follows have been reprinted from various periodicals during the year:

No. 62. Studies on the Rocky Mountain Flora — XIII, by Per Axel Rydberg.

No. 63. Chemical Stimulation of a Green Alga, by Burton Edward Livingston.

No. 64. The Occurrence and Origin of Amber in the Eastern United States, by Arthur Hollick.

No. 65. The Polyporaceae of North America — X, *Agaricus*, *Lenzites*, *Cerrena* and *Favolus*, by William A. Murrill.

No. 66. Studies on the Rocky Mountain Flora — XIV, by Per Axel Rydberg.

No. 67. Phycological Studies — I, New Chlorophyceae from Florida and the Bahamas, by Marshall Avery Howe.

No. 68. Bryological Notes — II, by Elizabeth Gertrude Britton.

No. 69. The Polyporaceae of North America — XI, A Synopsis of the Brown Pileate Species, by William Alphonso Murrill.

No. 70. The Polyporaceae of North America — XII, A Synopsis of the White and Bright-Colored Pileate Species, by William Alphonso Murrill.

No. 71. Studies on the Flora of Southern California, by LeRoy Abrams.

No. 72. Phycological Studies—II, New Chlorophyceae, new Rhodophyceae and miscellaneous notes, by Dr. M. A. Howe.

No. 73. Studies on the Rocky Mountain Flora — XV, by Dr. P. A. Rydberg.

North American Flora

This work is designed to present descriptions of all plants growing, independent of cultivation, in North America, here taken to include Greenland, Central America, the Republic of Panama, and the West Indies, except Trinidad, Tobago, and Curaçao and other islands off the north coast of Venezuela whose flora is essentially South American.

It will be published in parts at irregular intervals by the New York Botanical Garden through the aid of the income of the David Lydig Fund bequeathed by Charles P. Daly.

It is planned to issue parts as rapidly as they can be prepared, the extent of the work making it possible to commence publication at any number of points. The completed work will form a series of volumes with the following sequence:

Volume 1. Mycetozoa, Schizophyta, Diatomaceae.

Volumes 2 to 10. Fungi.

Volumes 11 to 13. Algae.

Volumes 14 and 15. Bryophyta.

Volume 16. Pteridophyta and Gymnospermae.

Volumes 17 to 19. Monocotyledones.

Volumes 20 to 30. Dicotyledones.

The preparation of the work has been referred by the Scientific Directors of the Garden to a committee consisting of Professors L. M. Underwood and N. L. Britton.

Volume 22, Part 1, including Podostemonaceae by George V. Nash, Crassulaceae by N. L. Britton and J. N. Rose, and Penthoraceae and Parnassiaceae by P. A. Rydberg, was issued May 22, 1905.

Volume 22, Part 2, including Saxifragaceae and Hydrangeaceae by J. K. Small and P. A. Rydberg, Cunoniaceae, Iteaceae and Hamamelidaceae by N. L. Britton, Pterostemonaceae by J. K. Small, Altingiaceae by Percy Wilson, and Phyllonomaceae by H. H. Rusby, was issued December 18, 1905.

Lectures

Two series of lectures especially designed for members of the Garden and their friends have been given, one in the spring and one in the fall. The subjects treated are as follows:

April 29. "The Indian and His Uses for Plants," by Mr. Frederick V. Coville.

May 6. "The Pines and their Life History," by Professor Francis E. Lloyd.

May 13. "Botanical Aspects of Deserts of Arizona, California, Sonora and Baja California," by Dr. D. T. MacDougal.

May 20. "The Coralline Seaweeds," by Dr. Marshall A. Howe.

May 27. "Cuba," by Dr. W. A. Murrill.

June 3. "Vegetable Poisons and their Strange Uses," by Dr. H. H. Rusby.

October 7. "Autumn Features of Native Trees and Shrubs," by Dr. N. L. Britton.

October 14. "Botanical Explorations in Haiti," by Mr. George V. Nash.

October 21. "The Faculties of Plants," by Dr. D. T. MacDougal.

October 28. "A Summer in the Desert," by Professor Francis E. Lloyd.

November 4. "The Sea-gardens of Tropical America," by Dr. Marshall A. Howe.

November 11. "Farming and Fruit Growing in Cuba," by Dr. W. A. Murrill.

November 18. "Fossil Plants," by Dr. Arthur Hollick.

November 25. "Tropical Fruits," by Professor Henry H. Rusby.

Two series of lectures have been given under the auspices of the Board of Education in connection with the nature-study work of 4 B and 5 B grades of the City Schools, especially designed for the pupils in the Borough of the Bronx. The first series, given to grade 4 B, was as follows:

Lecture I, "Flowerless Plants," by Dr. Marshall A. Howe, April 14, April 25, and April 28.

Lecture II, "Cultivation of Plants," by Mr. George V. Nash, May 5, May 9, and May 12.

Lecture III, "Classification of Plants," by Dr. N. L. Britton, May 16, May 19, and May 23.

The second series was as follows:

Grade 4 B

Lecture I, "The Cultivation of Plants," by Mr. George V. Nash was given to groups of pupils on Thursday, October 19, Friday, October 27, and Friday, November 3.

Lecture II, "Seedless Plants," by Dr. Marshall A. Howe, on Friday, November 10, Friday, November 17, and Friday, November 24.

Grade 5 B

Lecture I, "Industries Depending on Forests. Plant Products," by Dr. Henry H. Rusby, on Tuesday, October 17, Tuesday, October 24, and Tuesday, October 31.

Lecture II, "Woody Plants. Plants Without Wood. Protection of Trees in Cities," by Dr. W. A. Murrill, on Tuesday, November 14, Tuesday, November 21, and Tuesday, November 28.

Lecture III, "Classification of Plants," by Dr. N. L. Britton, was given on Tuesday, December 5, and Friday, December 8, and Tuesday, December 12.

The following lectures were given in the auditorium of the museum, in July, for the benefit of students attending the summer session of New York University:

"The Origin of Species," by Dr. D. T. MacDougal.

"The Cactus-family," by Dr. N. L. Britton.

"The Economic Uses of the Leguminosae," by Dr. Henry H. Rusby.

At the autumn exhibition of the Horticultural Society of New York held in the Museum, November 16, Dr. N. L. Britton gave an illustrated address on "Fruits of Native Trees and Shrubs."

Lectures of other Institutions by members of the staff have been given as follows:

January 15. Before the Port Richmond (Staten Island) Y. M. C. A. on "Social and Religious Life in Alaska," by Dr. Arthur Hollick.

June 30. On invitation of Miss Elizabeth Billings, at Woodstock, Vt., on "A Canoe Trip Down the Yukon River, Alaska," by Dr. Arthur Hollick.

July 26. "Aspects of Desert Vegetation," by Dr. D. T. MacDougal, at the Marine Biological Laboratory at Cold Spring Harbor, Long Island.

October 20. At Blacksburg, Va., under the auspices of the Virginia Polytechnic Institute, on "Cuba and Cuban Farming," by Dr. W. A. Murrill.

Also several lectures in New York City for the Board of Education on "Cuba" and "The Austrian Tyrol," by Dr. Murrill.

October 21. "Haiti — the Negro Republic," at the Field Columbian Museum, Chicago, by Mr. George V. Nash.

November 16. "The Hemlock Forest in the New York Botanical Garden, and what it signifies," before the Bronx Institute of Arts and Sciences at the Tremont branch of the New York Public Library, by Dr. N. L. Britton.

December 18. "Heredity and the Origin of Species," by Dr. D. T. MacDougal, before the Barnard Botanical Club, at Columbia University.

The meetings of the Torrey Botanical Club are held in the Laboratories eight times during the collegiate year.

In addition, a number of conferences have been held for the advanced pupils of the public schools, and guides have been furnished for parties which have been brought to the Garden by teachers for the inspection of the collections. Material for nature study has also been furnished to a number of schools on request.

The botanical conventions, held bi-weekly in the library, continue to be a source of great profit to the entire staff and to the botanists of neighboring institutions who attend them. These meetings afford an opportunity of presenting the results of investigations at an early moment and also give opportunity for discussion by specialists in every branch of the subject.

The following principal subjects have been presented during the year:

January 18. "Hybrids of the Evening-primroses," by Dr. D. T. MacDougal.

February 8. "Tertiary Plants from Maryland," by Dr. Arthur Hollick.

March 22. "What Constitutes a Leaf in a Fern," by Professor L. M. Underwood.

April 19. "The Behavior of the Pollen-tube in *Houstonia coerulea*," by Mr. C. A. Mathews.

May 3. "Exploration in the Delta of the Rio Colorado and Adjacent Deserts," by Dr. D. T. MacDougal.

October 18. "Observations on the Physiology of Stomata," by Professor F. E. Lloyd.

November 1. "Results of Recent Studies in Evolution," by Dr. D. T. MacDougal.

November 22. "Ascidia in *Fraxinus*," by Dr. G. H. Shull.

December 6. "Influence of Radioactive Substances upon Plants," by Dr. C. S. Gager.

In addition a large number of brief notices of minor results have been presented at these meetings.

Meteorological Observations

Meteorological observations have been continued throughout the year and the records have been added to the series which has been kept continuously since 1900. The total precipitation for 1905 amounts to 43.95 inches. The total period between the latest occurrence of freezing temperature in the spring and the earliest in the autumn was 165 days, compared with 168 days in 1902, 170 days in 1903, and 167 days in 1904. Early in the year I was called upon to produce and attest these records at the County Supreme Court in order to give testimony as to the conditions of rainfall during 1902, in a suit brought by property holders against the City for damages sustained on account of inadequate sewerage.

Laboratories

The appropriation for the laboratories has been expended in the increase of the equipment at all points, an extension made necessary by the constantly widening scope and importance of the investigations pursued in the Garden. Professor W. J. Gies has continued to act as consulting chemist, visiting the laboratories for the purpose of conference with persons engaged in chemical researches, once and sometimes twice weekly during the entire year. Late in the year the small stone house east of the Bronx River has been fitted with a cement floor, on which stone piers have been built to secure steadiness for delicate instruments. Other preparations have been made to convert this structure into a phytophysical laboratory. Some special investigations have already been begun there by Dr. Wm. Hallock, Professor of Physics in Columbia University.

The roof of the work room of the propagating houses has been raised and a second story added, which makes a commodious laboratory suitable for the extensive anatomical and taxonomic investigations on the cacti, and other fleshy plants,

which have been prosecuted by Dr. N. L. Britton for some time.

Tropical Laboratory

The tropical laboratory at Cinchona, Jamaica, has been maintained in readiness for the use of investigators who might visit it for the purpose of forwarding investigations of various kinds.

Dr. Forrest Shreve, Laboratory Assistant in the Garden, went to this laboratory in October and began some extensive researches on transpiration and on the physiology of epiphytes, which will engage his entire attention for several months. Other investigators making use of the facilities of this laboratory are noted below.

Special Investigations

The following alphabetical list contains the names of all persons to whom the privileges of the Garden have been granted for extended periods during the year, together with brief notes as to the special investigations pursued while in residence.

LeRoy Abrams. University of Southern California; Stanford University, A.B., 1899; A.M., 1902. Assistant in botany, Stanford University, 1900–1902. Instructor in botany, Stanford University, 1902–1904. Fellow in botany, Columbia University, 1904–5.

The flora of southern California.

Howard James Banker. Syracuse University, A.B., 1892; Columbia University, A.M., 1900. Professor of biology, De Pauw University.

The Hydnaceae of North America.

Mary Franklin Barrett. Smith College, B.L., 1901; Columbia University, A.M., 1905.

The Tremelline Fungi.

Charles Edward Wagstaff Bateson. Columbia College, E.M., 1902.

Elizabeth Billings.

Pedigree cultures of native plants.

GERTRUDE SIMMONS BURLINGHAM. Syracuse University, A.B., 1896.

The North American species of *Lactarius;* chemistry of plant nutrition.

IRA DIETRICH CARDIFF. Knox College, B.S., 1897. University of Chicago, 1899–1904, in part. Assistant in Botany, Columbia University, 1904–5.

Cytological studies in *Synapsis.*

MARY COE CHEDSEY. Teachers College, Columbia University, B.S., 1904.

Anatomy and physiology of growth.

WILLIAM CHAMBERS COKER. South Carolina College, B.S., 1894; Johns Hopkins University, Ph.D., 1901. Professor of Botany, University of North Carolina.

Flora of the Bahamas.

AMELIA BLAIR CRANE. Barnard College.

Morphology of fleshy fungi.

CLARA EATON CUMMINGS. Professor of Botany, Wellesley College.

Studies of lichens of Jamaica: Tropical Laboratory at Cinchona.

ELIAS JUDAH DURAND. Cornell University, A.B., 1893; D.Sc., 1895. Instructor in Botany, Cornell University.

North American Pyrenomycetes. Research scholarship, September, 1905.

JULIA TITUS EMERSON. Assistant in the laboratories, September, 1903.

The chemical properties of *Ibervillea*; systematic study of certain genera of mosses.

EDNA HAGUE FAWCETT. Smith College, B.L., 1901.

Senescence in plants.

CHARLES STUART GAGER. Syracuse University, A.B., 1895; Cornell University, Ph.D., 1902.

Investigation of the various relations of radium emanations to plants; embryology of hybrids.

HENRY ALLAN GLEASON. University of Illinois, B.S., 1901; A.M., 1904.

Systematic study of the Vernonieae; morphology of algae.

AMELIA RICHARDSON GOODLATTE. Wells College, A.B., 1900.

Anatomy of *Parosela spinosa.*

CLARENCE EVERETT GORDON, Columbia University, A.M., 1905.

BENJAMIN CHARLES GRUENBERG. University of Minnesota, B.S., 1896. Sugar-testing laboratory, U. S. Appraisers' Stores, N. Y. City. Instructor in biology in High Schools, N. Y. City.
Mycorrhizas.

ROLAND MCMILLAN HARPER. University of Georgia, B.E., 1897; Columbia University, Ph.D., 1905.
The flora of Georgia.

CAROLINE COVENTRY HAYNES.
A systematic study of some of the Hepaticae.

NELLIE PRISCILLA HEWINS. Cornell University, B. S., 1898; Columbia University, A.M., 1900.
Reactions of foliar organs to wounds,

ELA HOCKADAY. North Texas Normal School.
The lichen flora of Texas; general morphology.

IDA MAY HOPE. Barnard College, A.B., 1903.
Bacterial infection of wounds.

EDWIN WILLIAM HUMPHREYS. College of the City of New York, A.B., 1903.

CYRUS AMBROSE KING. State University of Indiana, A.B., 1893; Harvard University, A. B., 1897; A.M., 1898; Ph.D., 1902.
Cytology of the Phycomycetes.

ALICE ADELAIDE KNOX. Smith College, A.B., 1899.
Fasciation and heredity.

ELSIE M. KUPFER. Columbia University, A.B., 1899; A.M., 1901. Instructor in biology in Wadleigh High School Annex.
Studies upon the regeneration of plants.

MARION ELIZABETH LATHAM. Columbia University, A.B., 1903; A.M., 1905. Assistant in Botany, Barnard College.
Investigation of nitrogen metabolism in stimulated fungi.

BURTON EDWARD LIVINGSTON. University of Michigan, B.S., 1898; University of Chicago, Ph.D., 1902. Soil expert, Bureau of Soils, U. S. Department of Agriculture.
Studies of the physical qualities of soils and effects of chemical stimulation upon growth.

FLORA VIRGINIA LIVINGSTON.
Morphology of fungi.

Lucy MacIntyre.
Mosses of northeastern United States.

Chester Arthur Mathewson. University of Cincinnati, 1901–1903; Yale University, 1903–1904.
Pollen-tubes in *Houstonia*.

William Ralph Maxon. Syracuse University, Ph.B., 1898. Assistant Curator, U. S. National Museum, Washington, D. C.
The ferns of Tropical America. Research scholarship, November, 1905.

Florence Middleton. Columbia University.
Morphology of algae.

Charles Frederick Millspaugh. Student, Cornell University, class of 1875: New York Homeopathic Medical College, M.D., 1881. Curator, Department of Botany, Field Columbian Museum.
The flora of the West Indies.

Helen Letitia Palliser. Barnard College, A.B., 1905. Curtis Scholar in Botany, Barnard College, 1905–1906.
The Chaetomiaceae of North America; developmental anatomy; chemistry of plant nutrition.

Raymond Haynes Pond. Kansas State Agricultural College, B.S., 1898; M.S., 1899; University of Michigan, Ph.D., 1902. Professor of Botany and Pharmacognasy, Northwestern University.
Investigation of the enzymes in seeds of monocotyledons. Research scholarship for two months.

Charles Budd Robinson. Dalhousie University, A.B., 1891; student at Cambridge University, England, 1897–1899.
The Charas of North America; the flora of the Philippine Islands. Research scholarships for five months.

Winifred Josephine Robinson. Michigan State Normal School, B.Pd., 1892; University of Michigan, B.S., 1899. Instructor in biology, Vassar College.
The ferns of the Hawaiian Islands.

Natalie Sophie Roeth. Mt. Holyoke College, 1898.

Forrest Shreve. Johns Hopkins University, B.A., 1901; Ph.D., 1905. Fellow in Johns Hopkins University, 1905–1906. Re-

cently appointed assistant in laboratories of New York Botanical Garden. At Cinchona, since October 1, 1905.

Studies upon transpiration and upon the physiology of epiphytes.

MAUD JOHANNA STABER. Columbia University, B.S., 1901.

Anatomy of vascular plants; physiology of nutrition.

LILLIAN STEWART. Carleton College.

Anatomy and physiology of growth.

CHARLES RUPERT STOCKARD. Mississippi Agricultural and Mechanical College, B.S., 1899; M.S., 1902.

Cytological changes in gland-cells of *Vicia Faba*.

MARGARET HOLMES STONE. Barnard College, A.B., 1904.

Relation of various nutrient media to growth stimulation in fungi.

EMMA MARIE WOLD. Western College; University of Oregon, A.B., 1894; A.M., 1897.

Stimulative reactions of plants; morphology of algae.

MARY DOUGLASS WOMACK. Adelphi College, B.S., 1899.

Morphology of algae.

GEORGE CLAYTON WOOD. Syracuse University, A.B., 1900.

The lichen-flora of the eastern United States.

SHIGEO YAMANOUCHI. Higher Normal School, Tokyo. Assistant Professor, Higher Normal School, Tokyo.

Stimulative reactions and morphology of algae.

NAOHIDÉ YATSU. Tokyo University, Rigakushi (A.B.), 1900.

Cytological changes produced by chemical stimulation, and by mechanical injury.

HARLAN HARVEY YORK. De Pauw University, B.S., 1903; Ohio State University, M.A., 1905. Fellow in Botany, Columbia University, 1905–6.

The Malvaceae of North America; studies in plant physiology.

CHUNG YU WANG. Columbia University, A.M., 1904.

Palaeobotany.

The total registration for 1905 includes 53 persons who represent, by degrees received, or by incumbencies held, 45 institutions of collegiate rank or scientific purpose.

My investigations upon heredity and evolution have been continued. Further attention has been paid to Lamarck's evening primrose for the purpose of testing the frequency of

mutations in seeds from various parts of the world, and for making detailed anatomical studies of the newly originated forms.

In addition other species of the evening-primrose have been brought under cultivation and tested in purely pedigreed cultures with the result that some of these have been found to be in a mutating condition also. It is too early to make definite statements about all of them, but the common species *Oenothera biennis* has been seen to give rise to an atypic form which constitutes about one in two hundred of the progeny, and which has been brought to maturity in a number of individuals. It is now in the second generation, and is to be included among the forms which arise by saltatory inheritance.

The cultures for 1905 furnished three different types of bud-sports, and these have been guarded so that pure seeds were procured, with a view to testing the heredity of such structures.

Perhaps one of the most important results yet secured in these studies, if not in any experimental study of evolution, has been the induction of mutations in plants by osmotic and chemical stimulation of ovaries by various reagents.

Earlier results in this subject were embodied in a paper prepared by the coöperation of Miss A. M. Vail, Dr. J. K. Small, and Dr. G. H. Shull, entitled "Mutants and Hybrids of the Oenotheras" which was issued as Publication 24 of the Carnegie Institution of Washington in March, 1905. Another still more extensive paper by Miss A. M. Vail, Dr. G. H. Shull and myself dealing with the mutations, variations and relationships of the Oenotheras is in preparation and will also be offered the Carnegie Institution for publication.

A lecture dealing with the more important conclusions brought out in these researches was delivered before the Barnard Botanical Club at Columbia University, December 18, 1905, and will be published in the *Monist* for January, 1906. It has already been reprinted in advance under the title of "Heredity and the Origin of Species."

The lectures by Professor de Vries upon "Species and Varieties: Their Origin by Mutation" delivered at the University of California during the summer of 1904 were edited, and issued as a book of xviii + 847 pages by the Open Court Co. of Chicago. The first edition having been exhausted a second was prepared with the assistance of Miss A. M. Vail, in November and December, which will be issued under date of January, 1906.

The researches upon soil-temperatures have been continued at the Garden and at the Desert Botanical Laboratory at Tucson, Arizona. By the coöperation of Dr. Forrest Shreve, I have been able to have a third series of instruments at our tropical laboratory, at Cinchona, Jamaica.

I have continued to coöperate with the Station for Experimental Evolution at Cold Spring Harbor, L. I., and have made several visits to the place during the summer.

Early in March an expedition was organized which started from the Needles, at Mellen, Arizona, and descended the Colorado River in two small boats, one of which was fitted with a cage for carrying cacti. I was accompanied on the part of the trip from the start to Yuma by Mr. G. G. Copp, of New York, and Mr. Stanley Sykes, of Rhoades, Arizona. A large number of living specimens of cacti were obtained from both the Arizona and California shores, and it was definitely ascertained that *Cereus giganteus* is a component of the flora of California. At Yuma, Arizona, the expedition was joined by Mr. Godfrey Sykes, who had previously accompanied me in a trip to the lower part of the river, and by Mr. E. A. Goldman, of the U. S. Biological Survey. A new boat was built and the river was descended to the estuary and then the course was laid up the Hardy for the Cucopa mountains which had not previously been visited by a botanist. An interesting collection of living and preserved material from here and from the salt and alkaline desert near the mud-volcanoes was secured. In addition to extensive data bearing upon the geography of the region, some important facts as to desert vegetation were obtained. The principal results are

embodied in a paper to be published by the American Geographical Society in their Bulletin for January, 1906, and which is to be reprinted as Contribution 77 from the Garden.

I have continued to act as a member of the Advisory Committee, in charge of the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona.

Respectfully submitted,

D. T. MacDougal,

Assistant Director.

REPORT OF THE CURATOR OF THE MUSEUMS AND HERBARIUM

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: I have the honor to submit herewith my report as Curator of the Museums and Herbarium for the year 1905.

The means at our disposal were devoted to the improvement of the collections, rather than to their expansion, with the result that the collections have been brought into much more serviceable condition than they were before.

GENERAL ACCESSIONS. Specimens for the several collections have been brought together as follows:

(*a*) *Gifts and purchases.* By these means 6,428 specimens have been added.

(*b*) *Exchanges.* The returns from the disposal of duplicate material amounted to an aggregate of 9,751 specimens.

(*c*) *Exploration.* The system of exploration maintained by the Garden brought in 36,553 specimens from temperate and tropical North America and the Philippine Islands.

Thus the additions make a total of 52,732 specimens.

Museums

1. PREPARATION OF MATERIAL FOR EXHIBITION, AND APPLIANCES. The only museum equipment added during the year was specimen jars:

Glass jars. (Specimen jar, 2605, Whitall Tatum Co.)

Diameter.	Height.	Number of jars.
3 inches.	6 inches	48
3 "	8 "	108
4½ "	12 "	72
	Total,	228

These jars, together with exhibition blocks and other mechanical appliances remaining from last year, were used in installing specimens in the cases of the public museums. However, many specimens have been partially prepared for

permanent installation but have been held in storage for lack of equipment for placing them on exhibition.

2. ECONOMIC MUSEUM. The general arrangement of this museum remains the same as described in my last report. All lately acquired specimens, however, so far as our equipment permitted, were interpolated in their proper places or were used to replace inferior ones.

3. SYSTEMATIC MUSEUM. What has been said concerning the condition and development of the Economic Museum applies also to the Systematic Museum.

(*a*) *Synoptic collection.* This division has been renovated, and new material secured by gift or special collection has been added. Certain parts have also been rearranged to better advantage.

(*b*) *Local flora.* This remains practically as it was last year but much material representing the lower plant-groups, especially the algae and fungi, has been laid aside awaiting the mechanical means of installing it.

(*c*) *Microscopic exhibit.* This has not been developed further, but has been maintained to the best advantage, and continues to be especially attractive to the visiting public.

4. FOSSIL PLANT MUSEUM. The public exhibit of fossil plants has been improved where possible by addition of new specimens. The reserve and study collections have been greatly improved by the amplification of data on the original or field labels. The collection has been strengthened by the addition of specimens from Louisiana and Massachusetts, and from other parts of the Atlantic coastal plain.

The quantity and quality of specimens now held in storage, warrant the expansion of this museum into the west hall of the basement by the addition there of as many more exhibtion cases as are now in use in the east hall.

5. LABELING. Special attention was given to completing the labeling of the exhibits, and as a consequence those of the Economic Museum, the synoptic collection of the Systematic Museum and the Fossil Plant Museum are thoroughly labeled. During the year, too, many specimens have been

furnished with new labels containing more complete data than it was possible to print heretofore.

7. Care of the Museums. During the process of labeling and relabeling the exhibits, opportunity was taken for improving and cleaning specimens, and wherever insect activity was observed the specimens were treated with alcohol, chloroform or corrosive sublimate. It is interesting to note that each year shows a decrease in the deterioration of specimens.

7. Uses of the Museums. An increased public attendance, due apparently both to wider interest in the Garden and to the rapid growth of the Borough of the Bronx, was noticeable throughout the year.

Portions of the collections have been used in connection with instruction given at the Garden and at Columbia University. Schools or pupils under the guidance of instructors have been a conspicuous feature among the visitors, while representatives of commercial firms and manufacturers have been furnished information.

The museums were used this year to further illustrate the lectures given at the Garden in connection with the courses of nature-study work of the public schools of the Borough of the Bronx.

Herbarium

1. Accessions. All the plant-groups comprising the herbaria have been advantageously increased during the year. By exploration prosecuted on the North American mainland, including Panama, and in the West Indies and the Philippine Islands, much very valuable material was secured. By exchange, material from all parts of the world was added to our collections, while all valuable current general distributions of plants and exsiccatae were acquired.

2. Mounting and Conserving of Specimens.—The preparation and mounting of specimens was prosecuted throughout the year with as much rapidity as supplies and assistance permitted, and I am glad to be able to report that in spite of our reduced force of assistants we have about kept pace with the accessions throughout the year.

(*a*) *Flat or pressed specimens.*—About 34,174 herbarium sheets, containing fully 45,000 specimens, have been incorporated in the permanent collections.

(*b*) *Bulky specimens.*—Many specimens of a character not suitable for mounting on sheets have been temporarily stored awaiting a supply of cardboard boxes.

3. ARRANGEMENT OF THE HERBARIA.—The growth of the herbarium demanded a general rearrangement of most of the smaller groups, but the main groups are still located as they were last year, with the exception of the ferns, which are now advantageously arranged in the room east of the library.

(*a*) *Garden herbarium.*—Although the growth of this collection has not equalled that of former years from a numerical standpoint, the quality of the material added has been rather superior. The West Indian and Philippine specimens lately incorporated are of the greatest value.

Out of 52,025 specimens received for this collection about 43,000 were mounted on herbarium sheets and distributed in the cases.

(*b*) *Columbia University herbarium.*—The development and conservation of this collection continued as outlined in previous reports. Certain groups, too, have been rearranged in connection with the monographing of genera and families for the "North American Flora."

Additions aggregating 265 specimens were received, and these, together with about 2,000 specimens mostly from the Morong herbarium, deposited by Barnard College, were mounted and incorporated, thus making a total addition of fully 2,265 specimens.

(*c*) *Duplicate herbarium.*—About 6,000 specimens were distributed from our duplicate material. In return for these we have received valuable specimens, a majority of which will be used in the permanent collections.

5. USES OF THE HERBARIUM. The collections have been used for research work by the members of the staff and students, especially in connection with the preparation of manu-

script for the "North American Flora." They have also aided largely in the naming of the conservatory and out-door plant collections. Students have used such groups of this collection as their investigations demanded.

Investigators, chiefly students and officers of other institutions, have had access to the herbarium, and other persons duly qualified have also been able to examine specimens by your permission.

Assistance and Investigations

Dr. Shafer, Museum Custodian, has supervised the preparation of herbarium and museum material and the installation of the latter. He has made special and successful efforts to develop the exhibition of North American dendrology and the collection of drugs, as well as to strengthen the exhibits of the synoptic collection of the systematic museum. He has also continued his studies on the arborescent flora of North America.

Dr. Rydberg, Assistant Curator, has been in charge of the part of the herbarium composed of flowering plants. In addition to routine curatorial work, including the sorting, distributing and arranging of the herbarium specimens, he has also continued his work on the flora of the Rocky Mountain region, and portions of the results of his studies have been published during the year under the title, "Studies on the Rocky Mountain Flora, XIV and XV," in the *Bulletin of the Torrey Botanical Club*, for March and November, and "The genus *Astragalus* and segregates, represented in Colorado" in the same journal, for December. Monographs of Penthoraceae, Parnassiaceae, Saxifragaceae and Hydrangeaceae, the two latter families prepared in conjuction with the writer, have been published in the "North American Flora," Vol. 22, parts 1 and 2; his "Flora of Colorado," containing a catalogue and keys, which was mentioned in last year's report, is now in press.

During June, July and August he was occupied with botanical exploration in Utah, except for a short time spent in Cali-

fornia, where valuable material was secured, especially from Mount Tamalpais.

Dr. Hollick, Assistant Curator, has continued to develop the collection of fossil plants. In this connection he has prosecuted investigations of the cretaceous deposits on Staten Island, Long Island, Block Island and Martha's Vineyard. These investigations resulted in the discovery of amber, lignite and other remains of plants, all of which are of importance to the museum.

The following papers by Dr. Hollick have been published: "A Recent Discovery of Amber on Staten Island," JOURNAL for March, "The Occurence and Origin of Amber in the Eastern United States," *American Naturalist* for March. Several other papers prepared by Dr. Hollick will be published next year. A lecture entitled, "Fossil Plants" was given by Dr. Hollick in the fall lecture course at the Garden. He also delivered lectures at Port Richmond, New York, and at Woodstock, Vermont.

Dr. Howe, Assistant Curator, has continued to have special charge of the collections of algae and hepatics. Numerous specimens collected by himself or secured by exchanges have been incorporated in the general collections during the year. A beginning has been made toward exhibiting the algae of the local flora in the swinging frames of the public museum. In company with yourself, Dr. Howe spent portions of the winter and early spring in the Bahama Islands, engaged in making collections and field studies of marine algae of that region. Some of the results of this and previous expeditions have been published in the May and November numbers of the *Bulletin of the Torrey Botanical Club*. An account of "Some of the Coralline Seaweeds in the Museum" was published in the Garden JOURNAL for April. Dr. Howe has retained the editorship of the monthly periodical *Torreya* and has assisted in the courses of lectures conducted by the Garden in connection with the nature-study work of the public schools of the Borough of the Bronx.

Dr. Murrill, Assistant Curator, devoted his time largely to

field work in regions not well explored as far as the groups of fungi he is investigating are concerned. In the early part of the year explorations in Cuba yielded much interesting material. Later he attended the symposium of botanists at Ohio Pyle, Pennsylvania, during a season especially adapted to the development of all kinds of fungi, and during the rest of the summer he made large collections along the Potomac River in Virginia and the District of Columbia and in central Maine. A special feature of the field work was to secure copious and careful notes on the fungi collected. His investigations on the Polyporaceae have been continued and during the year his thirteenth contribution to the knowledge of that group has been reached. Several keys to special groups of fungi have been printed in *Torreya*, and accounts of his explorations in Cuba and Maine have appeared in our JOURNAL. A list of fungi collected at Ohio Pyle, Pa., has been prepared for a general report, which will be published by the secretary of the symposium held there last summer. Dr. Murrill also assisted in the courses of lectures conducted by the Garden in connection with the nature-study work of the public schools of the Borough of the Bronx.

Mrs. Britton has continued to lend her voluntary aid essentially in the capacity of an Assistant Curator, in developing the collection of mosses. The specimens she has added to this part of the herbarium by personal collections in the Bahama Islands and Bermuda and brought together by means of correspondence are all of great value. She has continued her studies of North American mosses, prepared manuscript for the "North American Flora" and actively prosecuted the task of rearranging the moss collection so that it may be used more advantageously. Mrs. Britton has published papers in the *Bryologist* and in the *Bulletin of the Torrey Botanical Club*. She has also acted as secretary of the Wild Flower Preservation Society of America and supervised the distribution of the prize essays and posters issued by means of the Stokes Fund.

Professor Underwood has also contributed his time and

best efforts for the development and perfection of the collection of ferns in connection with his elaborate study of the American fern-flora.

The writer, in addition to his curatorial duties, continued his studies on the plants of North America, especially in reference to those of the southeastern portion of the mainland and to certain families which he is monographing for forthcoming issues of the "North American Flora." I have published a paper, "Additions to the Flora of Subtropical Florida" in the Garden BULLETIN, and monographs of Pterostemonaceae, Saxifragaceae and Hydrangeaceae, the two latter families prepared in conjunction with Dr. Rydberg, have appeared in "North American Flora," Vol. 22, part 2.

Respectfully submitted,

J. K. SMALL,

Curator of the Museums and Herbarium.

REPORT OF THE HONORARY CURATOR OF THE ECONOMIC COLLECTIONS

Dr. N. L. Britton, Director-in-Chief.

Sir: I have the honor to submit the following report for the year 1905.

The most important work of the year has been the determination of a large number of unnamed specimens which had gradually accumulated in the cases, and the labeling of the same. I am now able to report that practically every specimen in our cases bears a printed label.

Descriptive labels have been prepared for a number of the more important articles, or series of articles, and the printing of such labels is being continued.

The new material acquired during the year includes a considerable number of tropical fruits, from various sources, many having been donated by exhibitors at the fall meeting of the New York Horticultural Society. Many have also been purchased in the New York market.

Other acquisitions worthy of special notice are the following:

More than 100 additional specimens of drugs have been donated by Messrs. Parke, Davis & Co.

More than 40 specimens of drugs, many of them rare or unusual, have been donated by Messrs. Lehn & Fink.

The India Rubber World, which last year donated an important collection of rubber products, has added materially to that collection during the present year.

Mr. John Lane Beck has also made important contributions to the rubber collections, including a bottle of the milk of the rubber tree in its natural liquid condition, and a set of the apparatus employed in the collection and preparation of rubber.

A small collection of fibers has been received from the United States Bureau of Plant Industry.

Mr. Shafer has continued his collection of winter twigs of trees and shrubs, practically completing the representation of the flora of this immediate vicinity.

In all 560 specimens have been added to the collections under my charge.

It is proposed to devote special attention during the coming year to the collection of aboriginal vegetable foods of the United States. A check-list is being prepared, and plans for securing as much as possible of the material are being made.

It is also intended to greatly enlarge our representation of vegetable poisons, and to affix labels descriptive of their historical and other uses.

A very important work is expected to be the installation of the Merck collection of proximate principles of plants, referred to in previous reports, and which is scheduled to arrive in New York, from Darmstadt, on January 18. This will be in many ways one of the most important and instructive exhibits in our museum.

Respectfully submitted,

H. H. Rusby,

Honorary Curator of the Economic Collections.

REPORT OF THE LIBRARIAN

To the Director-in-Chief.

Sir: I have the honor to submit the following report on the Library, covering the period from January 1, 1905, to January 1, 1906.

A census of the library was taken December 23, and the number of bound volumes was then found to be 17,629, showing an increase for the year of 1,872 volumes. Of these, 860 were purchased from the special book fund, 187 volumes were presented to the Garden, the remainder having been acquired by subscription and exchange or by deposit from other institutions. Of the number of unbound pamphlets no estimate has been made.

During the year 634 volumes have been bound, of which 110 volumes are serials and pamphlets deposited at the Garden by Columbia University.

The card-catalogue has been kept up to date; about 3,500 written cards having been added to it.

Additional exchanges have been arranged with other institutions, and the number of journals, periodicals, reports and other publications now received in that way in exchange for Garden publications, or by subscription, is about 500 as against 455 during 1904.

Accessions to the library, other than serials and regular exchanges, have been published monthly in the Journal.

A number of important series of scientific publications, such as the *American Journal of Science*, the *Transactions of the Academy of Science of Philadelphia*, the *Bulletin de la Société Impériale des Naturalistes de Moscou*, and others, amounting to 209 volumes, have been deposited by the American Museum of Natural History and the New York Academy of Sciences. This, with the gift from yourself of a complete set of the publications of the New York Academy of Sciences, amounting to 37 volumes, about completes the collection of the more important American scientific series. The Trustees

of Columbia University have continued to present current American and foreign agricultural departmental reports and miscellaneous botanical dissertations.

The rapid increase of books has necessitated more space and 20 quarter sections of steel stacks similar to existing ones have recently been put into place. An entire rearrangement of the stacks was successfully accomplished, the changes admitting of the possibility of the future construction of two new stacks at the southern end of the stack-room. These changes will provide space for from 4,000 to 5,000 volumes. The folio tables were also moved and differently spaced and the volumes rearranged more advantageously. Considerable additional space for development was thus secured.

The determinations and studies of the Asclepiadaceae have been continued from time to time and I have also participated in the work on heredity and evolution described by the Assistant Director, part of which has appeared as Publication 24 of the Carnegie Institution of Washington, and a continuance is to be included in a paper now in preparation to be offered to the same institution. Of the mutants of *Oenothera Lamarckiana*, plants of *O. brevistylis*, *O. scintillans*, *O. lata*, *O. oblonga* and *O. albida* have been followed from the seedling stage to maturity, and an anatomical description of these forms is included in the unfinished paper.

Similar studies of *Oenothera grandiflora*, *O. Oakesiana*, *O. Simsiana*, *O. parviflora* and *O. muricata* have been made, and the identity and general characters of all of these species seems now fairly well established. It is to be seen from the material, including seeds, living plants and preserved specimens, received from correspondents in various parts of the country, that there are a large number of elementary species of the evening-primroses, which have hitherto escaped detection. All plants received are grown in pedigreed cultures in order to establish their identity beyond mistake. Abundant material and numerous drawings are being made as a record of these studies.

Some assistance has also been rendered in the revision of

" Species and Varieties " by deVries, of which a second edition will appear shortly.

Respectfully submitted,
ANNA MURRAY VAIL,
Librarian.

LIST OF PERIODICALS

* Académie Internationale de Géographie Botanique, Le Mans, France. *Bulletin.*

Agricultural Experiment Station, Auburn, Ala.
" " " Tuskegee, Ala.
" " " Uniontown, Ala.
" " " Tucson, Ariz.
" " " Fayetteville, Ark.
" " " Berkeley, Calif.
" " " Fort Collins, Colo.
" " " New Haven, Conn.
" " " Storrs, Conn.
" " " Newark, Del.
" " " Lake City, Fla.
" " " Experiment, Ga.
" " " Honolulu, Hawaii.
" " " Moscow, Idaho.
" " " Urbana, Ill.
" " " Lafayette, Ind.
" " " Ames, Ia.
" " " Manhattan, Kans.
" " " Lexington, Ky.
" " " Baton Rouge, La.
" " " Orono, Me.
" " " College Park, Md.
" " " Amherst, Mass.
" " " Agricultural College, Mich.
" " " St. Anthony Park, St. Paul, Minn.

* Periodicals subscribed for by the Garden.

† Periodicals subscribed for by Columbia University and deposited at the Garden.

‡ Periodicals received in exchange by the Torrey Botanical Club and deposited at the Garden.

All others are received in exchange by the Garden.

Agricultural Experiment Station, Agricultural College, Miss.
" " " Columbia, Mo.
" " " Bozeman, Mont.
" " " Lincoln, Nebr.
" " " Reno, Nev.
" " " Durnham, N. H.
" " " New Brunswick, N. J.
" " " Mesilla Park, N. Mex.
" " " Geneva, N. Y.
" " " Ithaca, N. Y.
" " " Raleigh, N. C.
" " " Fargo, N. Dak.
" " " Wooster, Ohio.
" " " Stillwater, Oklahoma.
" " " Corvallis, Oregon.
" " " State College, Pa.
" " " Mayaguez, Porto Rico, W. I.
" " " Kingston, R. I.
" " " Clemson College, S. C.
" " " Brookings, S. Dak.
" " " Knoxville, Tenn.
" " " College Station, Texas.
" " " Logan, Utah.
" " " Burlington, Vt.
" " " Blacksburg, Va.
" " " Morgantown, W. Va.
" " " Pullman, Wash.
" " " Madison, Wis.
" " " Laramie, Wyo.

† Allgemeine Botanische Zeitschrift, Karlsruhe, Germany.

Amani. Biologisch-Landwirtschaftliches Institut, Bezirk Tanga, Deutsch-Ost-Afrika. *Berichte.*

America. Botanical Society of America. *Publications.*

America. Society of American Florists, Boston, Mass. *Proceedings.*

American Academy of Arts and Sciences, Boston, Mass. *Proceedings.*

American Agriculturist, New York, N. Y.

American Association for the Advancement of Science, Washington, D. C. *Proceedings.*

American Botanist, Binghamton, N. Y.
American Florist, Chicago, Ill.
American Homes and Gardens, New York, N. Y.
American Journal of Pharmacy, Philadelphia, Pa.
American Journal of Science, New Haven, Conn.
American Museum of Natural History, New York, N. Y. *Bulletin*, *Journal*, *Report*.
‡ American Naturalist, Boston, Mass.
‡ American Philosophical Society, Philadelphia, Pa. *Proceedings*.
American Rose Society, New York, N. Y. *Bulletin*.
† Annales des Sciences Naturelles: Botanique; Paris, France.
Annales Mycologici, Berlin, Germany.
Annali di Botanica: see Rome, R. Istituto Botanico.
‡ Annals of Botany, London, England.
Antwerp. Jardin Botanique, Antwerp, Belgium. *Seed Lists*.
Appalachian Mountain Club, Boston, Mass. *Appalachia*.
Arboriculture: see International Society of Arboriculture.
* Archiv der Pharmazie, Berlin, Germany.
Ardennes. Société d'Histoire Naturelle, Charleville, France. *Bulletin*.
Argentine Republic. Museo de La Plata, Province de Buenos Aires. *Anales*.
Argentine Republic. Sociedad Cientifica Argentina, Buenos Aires. *Anales*.
Arkiv för Botanik: see Sweden, Kongliga Svenska Vetenskaps-Akademien.
Asiatic Society of Bengal: see Bengal, Asiatic Society.
Asmara. Ufficio Agrario Sperimentale, Asmara, Colonia Eritrea, N. E. Africa. *Bollettino*.
Association pour la Protection des Plantes, Geneva, Switzerland. *Bulletin*.
Audubon Park: see New Orleans.
Basle. Naturforschende Gesellschaft, Basle, Switzerland. *Verhandlungen*.
Bavaria. Bayerische Gesellschaft zur Erforschung der heimischen Flora, Munich, Bavaria. *Berichte*, *Mittheilungen*.
Beiträge zur Wissenschaftlichen Botanik, Stuttgart, Germany.
Belgium. Société Royale de Botanique de Belgique, Brussels, Belgium. *Bulletin*.
Belgrade. Jardin Botanique "Jevremovac," Belgrade, Servia. *Seed Lists*.

Belize. Botanical Garden, Belize, British Honduras, Central America.

Bengal. Asiatic Society of Bengal, Calcutta, India. *Journal.*

Bergianska Trädgården, Stockholm, Sweden. *Acta Horti Bergiani.*

‡ Berlin. Königlicher Botanischer Garten, Berlin, Germany. *Notizblatt.*

Bernice Pauahi Bishop Museum, Honolulu, Hawaii.

† Bibliotheca Botanica, Stuttgart, Germany.

* Biltmore Botanical Studies, Biltmore, N. C.

* Biologisches Centralblatt, Leipzig, Germany.

* Biometrika, London, England.

Bombay. Victoria Gardens, Bombay, India. *Report.*

Boston. Board of Commissioners of Department of Parks, Jamaica Plain, Mass. *Annual Report.*

Boston. Board of Metropolitan Park Commissioners, Boston, Mass. *Report.*

‡ Boston Society of Natural History, Boston, Mass. *Proceedings.*

Botanical Gazette, Chicago, Ill.

† Botanical Magazine, London, England.

Botanical Society of America: see America, Botanical Society.

† Botanische Jahrbücher, Leipzig, Germany.

† Botanische Zeitung, Leipzig, Germany.

† Botanischer Jahresbericht, Leipzig, Germany.

† Botanisches Centralblatt, Cassel, Germany.

† Botanisches Centralblatt: Beihefte, Cassel, Germany.

‡ Botanisk Tidsskrift: see Copenhagen, Société Botanique.

Botaniste: see Le Botaniste.

Botaniska Notiser, Lund, Sweden.

Brandenburg. Botanischer Verein der Provinz Brandenburg, Berlin, Germany. *Verhandlungen.*

Bremen. Naturwissenschaftlicher Verein, Bremen, Germany. *Abhandlungen.*

* British Mycological Society, Worcester, England. *Transactions.*

Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y. *Memoirs of Natural Science*, *Science Bulletin*, *Children's Museum Bulletin*, *Children's Museum News*, *Cold Spring Harbor Monographs.*

Brussels. Institut Botanique de l'Université, Brussels, Belgium. *Recueil.*

Brussels. Jardin Botanique de l'État, Brussels, Belgium. *Bulletin.*

* Bryologist, Brooklyn, N. Y.

Bucharest. Institut Botanique, Bucharest, Roumania. *Bulletin de l'Herbier.*

Buenos Aires. Museo de Farmacologia, Buenos Aires, Argentine Republic. *Trabajos.*

Buenos Aires. Museo Nacional, Buenos Aires, Argentine Republic. *Anales.*

Buffalo Botanic Garden, West Seneca, N. Y.

Buffalo Park Commissioners, Buffalo, N. Y. *Annual Report.*

Buffalo Society of Natural Sciences, Buffalo, N. Y. *Bulletin.*

* Buitenzorg. Jardin Botanique, Buitenzorg, Java. *Annales.*

Buitenzorg. Jardin Botanique, Buitenzorg, Java. *Bulletin*, *Mededeelingen*, *Verslag*, *Icones Bogorienses.*

* Bulletin du Jardin Colonial et des Jardins d'Essai des Colonies Françaises, Paris, France.

Bulletin of Pharmacy, Detroit, Mich.

Calcutta. Indian Museum, Calcutta, India. *Indian Museum Notes.*

‡ Calcutta. Royal Botanical Gardens, Calcutta, India. *Annals.*

California Academy of Sciences, San Francisco, Calif. *Proceedings.*

California Floriculturist, Los Angeles, Calif.

California State Agricultural Society, Sacramento, Calif. *Transactions.*

California State Board of Horticulture, Sacramento, Calif. *Report.*

California. University of California, Berkeley, Calif. *Contributions from the Botanical Seminary*, *Contributions from the Botanical Laboratory*, *Seed Lists.*

Canada. Botanical Club of Canada, Halifax, Canada. *Annual Report.*

Canada. Geological and Natural History Survey, Ottawa, Canada. *Contributions from the Herbarium.*

Canada. Report of the Minister of Agriculture, Ottawa, Canada.

‡ Canadian Record of Science, Montreal, Canada.

Carnegie Institution, Washington, D. C. *Yearbook.*

Carnegie Institution of Washington: Station for Experimental Evolution, Cold Spring Harbor, N. Y. *Papers.*

Carnegie Institution of Washington: Desert Botanical Laboratory, Tucson, Arizona. *Papers.*

Cellule: see La Cellule.

* Centralblatt für Bakteriologie: Abtheilung I, Jena, Germany.

* Centralblatt für Bakteriologie: Abtheilung II, Jena, Germany.

Chicago Hardwood Record, Chicago, Ill.

Chicago. University of Chicago, Chicago, Ill. *Contributions from the Hull Botanical Laboratory.*

Chile. Museo Nacional, Santiago de Chile, Chile. *Anales.*

Christiania. Hortus Botanicus, Christiania, Norway. *Seed Lists.*

Christiania. Physiographiske Forening, Christiania, Norway. *Nyt Magazin for Naturvidenskaberne.*

Christiania. Videnskabs-Selskabet, Christiania, Norway. *Skrifter.*

Cincinnati. Botanical Gardens, Cincinnati, Ohio.

Cincinnati Society of Natural History, Cincinnati, Ohio. *Journal.*

Clara Leigh Dwight Gardens, Mount Holyoke College, Mass. *Seed Lists.*

Cold Spring Harbor Monographs: see Brooklyn Institute of Arts and Sciences.

Colorado College Studies, Colorado Springs, Colo.

Colorado State Board of Agriculture, Denver, Colo. *Annual Report.*

Colorado. University of Colorado, Boulder, Colo. *Studies.*

Columbia University, New York, N. Y. *Contributions from the Department of Botany*, *Memoirs of the Department of Botany*, *Contributions from the Department of Geology.*

‡ Columbus Horticultural Society, Columbus, Ohio. *Journal.*

Connecticut Academy of Arts and Sciences, New Haven, Conn. *Transactions.*

Connecticut. Geological and Natural History Survey, Hartford, Conn. *Bulletin.*

Connecticut State Board of Agriculture, Hartford, Conn. *Annual Report.*

‡ Copenhagen. Société Botanique, Copenhagen, Denmark. *Botanisk Tidsskrift.*

Costa-Rica. Instituto Fisico-geografico, San José de Costa Rica. *Boletin.*

‡ Country Calendar, New York, N. Y.

Cuba. Estación Central Agronómica, Santiago de las Vegas, Cuba, W. I. *Circular*, *Bulletin.*

Curtis' Botanical Magazine: see Botanical Magazine.

Davenport Academy of Sciences, Davenport, Ia. *Proceedings.*

Dennison University, Granville, O. *Bulletin of the Scientific Laboratories.*

Desert Botanical Laboratory: see Carnegie Institution, Desert Botanical Laboratory.

Detroit. Commissioner of Parks and Boulevards, Detroit, Mich. *Annual Report.*

‡ Deutsche Botanische Gesellschaft, Berlin, Germany. *Berichte.*

‡ Deutsche Botanische Monatsschrift, Arnstadt, Germany.

Deutsche Dendrologische Gesellschaft, Poppelsdorf bei Bonn, Germany. *Mitteilungen.*

Dorpat: see Jurjeff.

Dublany. Hortus Botanicus Academicus: see Lemberg, Hortus Botanicus.

Dublin. Botanic Gardens of the Royal Dublin Society, Glasnevin, Dublin, Ireland. *Seed Lists.*

‡ Edinburgh Botanical Society, Edinburgh, Scotland. *Transactions.*

Edinburgh. Royal Botanic Garden, Edinburgh, Scotland. *Seed Lists.*

Eli Lilly and Company, Indianapolis, Ind.

Elisha Mitchell Scientific Society, Chapel Hill, N. C. *Journal.*

Eritrea: see Asmara.

Fauna: see Luxemburg, Société des Naturalistes Luxembourgeois.

* Fern Bulletin, Binghamton, N. Y.

Feuille des Jeunes Naturalistes, Paris, France.

Field Columbian Museum, Chicago, Ill. *Publications — Botanical Series*, *Report Series.*

† Flora, Marburg, Germany.

* Flora and Sylva, London, England.

Floral Life, Springfield, Ohio.

Florence. R. Orto Botanico, Florence, Italy. *Lavori.*

Florida. Report of the Commissioner of Agriculture, Jacksonville, Fla.

Florida State Horticultural Society, Tallahassee, Fla. *Proceedings.*

Florists' Exchange, New York, N. Y.

Forestry and Irrigation, Washington, D. C.

Forestry Quarterly, Ithaca, N. Y.

† France. Société Botanique de France, Paris, France. *Bulletin.*

† France. Société Mycologique de France, Paris, France. *Bulletin.*

Frankfort on Main. Senckenbergische Naturforschende Gesellschaft, Frankfurt a/M., Germany. *Berichte.*

‡ Frankfort on Oder. Naturwissenschaftlicher Verein des Regierungsbezirkes, Frankfurt a/O., Germany. *Helios.*

† Garden, London, England.

‡ Garden Magazine, New York, N. Y.

† Gardener's Chronicle, London, England.

‡ Gardener's Chronicle of America, New York, N. Y.

Gardening, Chicago, Ill.

* Gartenflora, Munich, Bavaria, Germany.

* Gartenkunst, Berlin, Germany.

Geneva. Jardin d'Acclimatation Alpin, Geneva, Switzerland. *Seed Lists.*

Geneva. Jardin Botanique de Geneve, Geneva, Switzerland. *Bulletin du Laboratoire Général*, *Annuaire.*

Georgia State Horticultural Society, Augusta, Ga. *Proceedings.*

Gray Herbarium: see Harvard University.

Groningen. Jardin Botanique de l'Université, Groningen, Holland. *Seed Lists.*

Hamburg. Naturwissenschaftlicher Verein, Hamburg, Germany. *Verhandlungen*, *Botanical papers from the Abhandlungen.*

Hamburgische Botanische Staatsinstitute, Hamburg, Germany. *Seed Lists.*

Hamilton Scientific Association, Hamilton, Ontario. *Journal and Proceedings.*

Harlem. Koloniaal Museum te Haarlem, Harlem, Holland. *Bulletin.*

Hartley Botanical Laboratories: University of Liverpool, Liverpool, England. *Publications and Reprints.*

Harvard University, Cambridge, Mass. *Contributions from the Gray Herbarium*, *Contributions from the Cryptogamic Laboratory.*

Havana. Jardin Botanico de la Universidad, Havana, Cuba.

‡ Hedwigia, Dresden, Germany.

Helios: see Frankfort on Oder, Naturwissenschaftlicher Verein.
Hérault. Société d'Horticulture et d'Histoire Naturelle de l'Hérault, Montpellier, France. *Annales.*
Herbier Boissier, Geneva, Switzerland. *Bulletin.*
Holland. Société Botanique Néerlandaise, Nijmegen, Holland. *Nederlandsch Kruidkundig Archief*, *Verslagen en Mededelingen*, *Travaux de botanique.*
Hooker's Icones Plantarum: see Icones Plantarum.
Hopkins Seaside Laboratory: see Leland Stanford Jr. University.
Horticulture, Boston, Mass.
Hortus Thenensis; see Tirlemont.
* House and Garden, Philadelphia, Pa.
Hull Botanical Laboratory: see Chicago, University.
Hungary. Institut central ampelogique royal Hongrois. Budapest, Hungary. *Annales.*
‡ Icones Plantarum, London, England.
Icones Selectae Horti Thenensis: see Tirlemont.
Illinois Farmer's Institute, Springfield, Ill. *Annual Report.*
Illinois State Department of Agriculture, Springfield, Ill. *Transactions.*
Illinois State Laboratory of Natural History, Urbana, Ill. *Bulletin.*
India. Botanical Survey of India, Calcutta, India. *Records.*
India Rubber World, New York, N. Y.
Indian Museum Notes: see Calcutta, Indian Museum.
Indiana Academy of Science, Indianapolis, Ind. *Proceedings.*
Indiana Horticultural Society, Indianapolis, Ind. *Transactions.*
International Catalogue of Scientific Literature: Botany, London, England.
International Society of Arboriculture, Connersville, Ind. *Arboriculture.*
Iowa Academy of Sciences, Des Moines, Ia. *Proceedings.*
Iowa Department of Agriculture, Des Moines, Ia. *Yearbook.*
Iowa Park and Forestry Association, Iowa City, Ia. *Proceedings.*
Iowa State College of Agriculture and Mechanic Arts, Ames, Ia. *Contributions from the Botanical Department.*
Iowa State Horticultural Society, Des Moines, Ia. *Transactions.*

Iowa State University, Iowa City, Ia. *Bulletin of the Natural History Laboratories.*

Italia Orticola, Naples, Italy.

‡ Italy. Società Botanica Italiana, Florence, Italy. *Bullettino, Nuovo Giornale Botanico Italiano, Bullettino Bibliografico.*

† Jahrbücher für Wissenschaftliche Botanik, Leipzig, Germany.

* Jahresbericht der Vereinigung der Vertreter der Angewandten Botanik, Berlin, Germany.

† Jahresbericht über die Fortschritte in der Lehre von den Pathogenen Mikroorganismen, Leipzig, Germany.

Jamaica. Public Gardens and Plantations, Kingston, Jamaica. *Bulletin of the Department of Agriculture.*

Jardin Colonial: see Bulletin du Jardin Colonial et des Jardins d'Essai des Colonies Françaises.

Java. Proefstation voor Suikerriet in West Java, Dutch East Indies. *Mededeelingen.*

"Jevremovac": see Belgrade, Jardin Botanique "Jevremovac."

Johns Hopkins University, Baltimore, Md. *Circulars.*

* Journal d'Agriculture Tropicale, Paris, France.

† Journal de Botanique, Paris, France.

* Journal des Roses, Melun, Paris.

* Journal of Biological Chemistry, New York, N. Y.

‡ Journal of Botany British and Foreign, London, England.

Journal of Geography, Columbia University, New York, N. Y.

Journal of Mycology, Columbus, Ohio.

Journal of Pharmacology, New York, N. Y.

Jurjeff. University, Jurjeff (Dorpat), Russia. *Acta Horti Botanici.*

Kansas Academy of Sciences, Topeka, Kans. *Transactions.*

Kansas University Science Bulletin, Lawrence, Kans.

Karlsruhe. Botanischer Garten der Technischen Hochschule, Karlsruhe, Germany. *Seed Lists.*

Kew. Royal Gardens, Kew, England. *Bulletin of Miscellaneous Information.*

Kharkow. Société des Naturalistes de l'Université Impériale à Kharkow, Kharkow, Russia. *Travaux.*

* La Cellule, Lierre, France.

La Naturaleza: see Mexico, Sociedad Mexicana de Historia Natural.

Landshut. Botanischer Verein, Landshut, Bavaria, Germany. *Berichte.*

* Leaflets of Botanical Observation and Criticism, Washington, D. C.
* Le Botaniste, Poitiers, France.
Leland Stanford Jr. University: Hopkins Seaside Laboratory, San Francisco, Calif. *Contributions.*
Lemberg. Hortus Botanicus Academicus Dublanensis, Lemberg, Austria. *Seed Lists.*
Leyden. Ryks Herbarium, Leyden, Holland. *Annales du Musée.*
Leyden. University Botanic Garden, Leyden, Holland. *Seed Lists.*
Liège. Institut Botanique de l'Université, Liège, Belgium. *Archives.*
Lima. Sociedad Geografica de Lima, Lima, Peru. *Boletin.*
* Lindenia, Brussels, Belgium.
* Linnean Society, London, England. *Transactions: Botany, Journal: Botany.*
Lloyd Mycological Museum, Cincinnati, Ohio. *Report, Mycological Notes, Reproduction Series, Bulletin.*
London. Royal Colonial Institute, London, England. *Proceedings.*
* London. Royal Horticultural Society, London, England. *Journal.*
‡ London. Royal Microscopical Society, London, England. *Journal.*
"Lotos": see Prag, Deutscher Naturwissenschaftlich-medicinischer Verein für Böhmen: "Lotos."
Lund. Hortus Botanicus, Lund, Sweden. *Seed Lists.*
Luxemburg. Société Botanique du Grand Duché de Luxembourg, Luxembourg, Gd. Duché de Luxembourg. *Recueil.*
Luxemburg. Société des Naturalistes Luxembourgeois, Luxembourg, Gd. Duché de Luxembourg. *Fauna.*
Lyons. Jardin Botanique de la Faculté Mixte de Medecine et de Pharmacie, Lyons, France. *Seed Lists.*
Lyons. Jardin Botanique de la Ville, Lyons, France. *Seed Lists.*
‡ Lyons. Société Botanique de Lyon, Lyons, France. *Annales.*
McGill University, Montreal, Canada. *Papers from the Department of Botany.*
Macon. Société d'Histoire Naturelle, Macon, France. *Bulletin.*
Madrid. Horto botanico, Madrid, Spain.

Magyar Botanikai Lapok, Budapest, Hungary.

Maine. Report of the Agricultural Commissioner, Augusta, Me.

Malay Peninsula. Agricultural Bulletin of the Malay Peninsula, Singapore, Straits Settlements.

† Malpighia, Genoa, Italy.

Manchester Institute of Arts and Sciences, Manchester, N. H. *Proceedings.*

Manchester Museum, Owens College, Manchester, England. *Reports*, *Publications.*

* Marcellia, Avellino, Italy.

Marseilles. Institut Colonial, Marseilles, France. *Annales.*

Maryland Geological and Natural History Survey, Baltimore, Md.

Massachusetts Horticultural Society, Boston, Mass. *Transactions.*

Massachusetts State Board of Agriculture, Boston, Mass. *Annual Report.*

Mayflower, Floral Park, Long Island, N. Y.

Mazama, Portland, Oregon.

Mexico. Instituto Medico Nacional, Mexico, Mexico. *Anales.*

Mexico. Sociedad Mexicana de Historia Natural, Mexico, Mexico. *La Naturaleza.*

Michigan Academy of Science, Ann Arbor, Mich. *Report.*

Michigan Horticultural Society, Lansing, Mich. *Annual Report.*

Michigan. Report of the Secretary of State relating to Farms and Farm Products, Lansing, Mich.

Michigan State Farmers' Institutes, Agricultural College, Mich. *Bulletin.*

Minnesota. Geological and Natural History Survey, Minneapolis, Minn. *Bulletin*, *Report.*

Minnesota Horticultural Society, Minneapolis, Minn. *Transactions.*

‡ Minnesota Horticulturist, Minneapolis, Minn.

Miramichi. Natural History Association of Miramichi, Chatham, N. B. *Proceedings.*

Missouri Botanical Garden, St. Louis, Mo. *Report.*

Missouri State Fruit Experiment Station, Mountain Grove, Mo. *Bulletin*, *Report.*

Missouri State Horticultural Society, Jefferson City, Mo. *Annual Report.*

Modena. R. Orto Botanico, Modena, Italy. *Seed Lists.*

† Monatsschrift für Kakteenkunde, Neudamm, Germany.

Montana Agricultural College Science Studies: Botany, Bozeman, Mont.

Montana. University of Montana, Missoula, Mont. *Bulletin: Biological Series.*

Montevideo. Museo Nacional, Montevideo, Uruguay. *Anales.*

Montpellier. Institut de Botanique, Montpellier, France. *Seed Lists.*

Moscow. Institut Agronomique, Moscow, Russia. *Annales.*

Moscow. Société Impériale des Naturalistes, Moscow, Russia. *Bulletin.*

Muhlenbergia, Los Gatos, Calif.

Munich. Königlicher Botanischer Garten, Munich, Bavaria. *Seed Lists.*

Musée Teyler, Haarlem, Holland. *Archives.*

Naples. Società di Naturalisti in Napoli, Naples, Italy. *Bollettino.*

Naturaleza: see Mexico, Sociedad Mexicana de Historia Natural.

Naturalist (The), Hull, England.

Nature, London, England.

Nature Notes: The Magazine of the Selborne Society, London, England.

Nebraska State Horticultural Society, Lincoln, Neb. *Annual Report.*

Nebraska. University of Nebraska, Lincoln, Neb. *Contributions from the Botanical Department.*

Nederlandsch Kruidkundig Archief: see Holland, Société Botanique Néerlandaise.

New Brunswick. Natural History Society of New Brunswick, St. John, N. B., Canada. *Bulletin.*

New England Botanical Club: see Rhodora.

New Hampshire. Board of Agriculture, Manchester, N. H. *Annual Report.*

New Jersey State Board of Agriculture, Trenton, N. J. *Annual Report.*

New Jersey State Horticultural Society, Trenton, N. J. *Proceedings.*

New Orleans. Audubon Park, New Orleans, La. *Yearbook.*

New Phytologist, London, England.

New South Wales. Linnean Society, Sydney, N. S. W. *Proceedings.*

New York Academy of Sciences, New York, N. Y. *Annals.*

New York City. Art Commission, New York, N. Y. *Annual Report.*

New York Farmers, New York, N. Y. *Proceedings.*

New York. Forest, Fish and Game Commission, Albany, N. Y. *Annual Report.*

New York Horticultural Society, New York, N. Y. *Report, Memoirs.*

New York. Municipal Art Society, New York, N. Y. *Bulletin.*

New York Public Library, New York, N. Y. *Bulletin.*

New York State Department of Agriculture, Albany, N. Y. *Annual Report.*

New York State Museum of Natural History, Albany, N. Y. *Annual Report.*

New York. Tree Planting Association of New York City, New York, N. Y. *Circulars.*

New York Zoölogical Society, New York, N. Y. *Report, News Bulletin.*

Nova Scotia. Secretary for Agriculture, Halifax, N. S., Canada. *Annual Report.*

Nova Scotian Institute of Science, Halifax, Canada. *Proceedings, Transactions.*

Nuova Notarisia, Padua, Italy.

Nuovo Giornale Botanico Italiano: see Italy, Società Botanica Italiana.

Nürnberg. Naturhistorische Gesellschaft, Nürnberg, Germany. *Abhandlungen.*

Nyt Magazin: see Christiania, Physiographiske Forening.

Oberlin College, Oberlin, Ohio. *Laboratory Bulletin.*

Ohio Mycological Bulletin: see Ohio State University.

Ohio Naturalist: see Ohio State University, Biological Club.

Ohio State Academy of Science, Columbus, Ohio. *Proceedings.*

Ohio State Board of Agriculture, Columbus, Ohio. *Annual Report.*

Ohio State University, Columbus, Ohio. *Bulletin: Botanical Series, Ohio Mycological Bulletin.*

Ohio State University: Biological Club, Columbus, Ohio. *Ohio Naturalist.*

* Orchid Review, London, England.

Oregon State Board of Horticulture, Salem, Oregon. *Report.*

† Österreichische Botanische Zeitschrift, Vienna, Austria.

Ottawa. Central Experiment Farm, Ottawa, Canada. *Bulletin*, *Report.*

Ottawa Naturalist, Ottawa, Canada.

Palermo. R. Istituto ed Orto Botanico, Palermo, Italy. *Bolletino; Contribuzioni alla Biologia Vegetale.*

Paris. Muséum d'Histoire Naturelle, Paris, France. *Bulletin.*

Paris. Société Linnéenne de Paris, Paris, France. *Bulletin Mensuel.*

Park and Cemetery, Chicago, Ill.

Pennsylvania Botanical Society, Philadelphia, Pa. *Proceedings.*

Pennsylvania Department of Forestry, Harrisburg, Pa. *Report.*

Pennsylvania Forestry Association, Philadelphia, Pa. *Forest Leaves.*

Pennsylvania. University of Pennsylvania, Philadelphia, Pa. *Contributions from the Department of Botany.*

Peradeniya. Royal Botanic Gardens, Peradeniya, Ceylon. *Annals.*

‡ Pharmaceutical Archives, Milwaukee, Wis.

Pharmaceutical Record, New York, N. Y.

Pharmaceutical Review, Milwaukee, Wis.

Philadelphia. Academy of Natural Sciences, Philadelphia, Pa. *Proceedings.*

Philadelphia Commercial Museum, Philadelphia, Pa. *Publications.*

Philadelphia Geographical Society, Philadelphia, Pa. *Bulletin.*

Philippine Islands. Bureau of Agriculture, Manila, Philippine Ids. *Report*, *Bulletin*, *Farmers Bulletin*, *Press Bulletin.*

Philippine Islands. Bureau of Government Laboratories, Manila, Philippine Ids. *Publications.*

‡ Pittonia, Washington, D. C.

Plant World, New York, N. Y.

Popular Science Monthly, New York, N. Y.

Portici. R. Scuola Superiore di Agricoltura, Portici, Italy. *Annali.*

Portland Society of Natural History, Portland, Me. *Proceedings.*

Prag. Deutscher Naturwissenschaftlich-medicinischer Verein für Böhmen: "Lotos," Prag, Bohemia, Austria. "*Lotos.*"

Preservation of Native Plants: see Society for the Preservation of Native Plants.

Providence. Park Commissioners, Providence, R. I. *Annual Report.*

Queen College Library, Kingston, Ontario, Canada.

Regensburg. Kgl. Botanische Gesellschaft, Regensburg, Bavaria, Germany. *Denkschriften.*

*Repertorium novarum specierum regni vegetabilis, Berlin, Germany.

Revue Bryologique, Cahan, Athis, France.

Revue de l'Horticulture Belge et Etrangère, Ghent, Belgium.

Revue des Cultures Coloniales, Paris, France.

† Revue Générale de Botanique, Paris, France.

* Revue Horticole, Paris, France.

‡ Revue Mycologique, Toulouse, France.

Revue Scientifique du Bourbonnais et du Centre de la France, Moulins, France.

* Rhodora, Boston, Mass.

Rio de Janeiro. Museu nacional do Rio de Janeiro, Rio de Janeiro, Brazil. *Archivos.*

Rochester Academy of Sciences, Rochester, N. Y. *Proceedings.*

Rome. R. Istituto Botanico, Rome, Italy. *Annuario; Annali di Botanica.*

Rome. R. Stazione Agraria Sperimentale, Rome, Italy. *Bollettino.*

Royal Gardens, Kew: see Kew, Royal Gardens.

Royal Horticultural Society: see London, Royal Horticultural Society.

Royal Microscopical Society: see London, Royal Microscopical Society.

Rural New Yorker, New York, N. Y.

St. Louis. Academy of Science, St. Louis, Mo. *Transactions.*

St. Petersburg. Académie Impériale des Sciences, St. Petersburg, Russia. *Travaux du Musée Botanique.*

St. Petersburg. Institut et Jardin Botanique de l'Université Impériale, St. Petersburg, Russia. *Scripta Botanica*, *Seed Lists.*

† St. Petersburg. Jardin Impérial Botanique, St. Petersburg, Russia. *Acta*, *Bulletin*, *Seed Lists.*

Santa Barbara Society of Natural History, Santa Barbara, Calif. *Bulletin.*

Santiago de Chile: see Chile, Museo Nacional.

Saone-et-Loire. Société des Sciences Naturelles de Saone-et-Loire, Chalon-sur-Saone, France. *Bulletin.*

São Paulo. Sociedade Scientifica de São Paulo, São Paulo, Brazil. *Revista.*

Scafati. R. Istituto Sperimentale di Scafati, Salerno, Italy. *Bollettino Tecnico.*

Schweizerische Botanische Gesellschaft, Bern, Switzerland. *Berichte.*

Science, New York, N. Y.

Scientific Roll, London, England.

Selborne Society: see Nature Notes.

Senckenbergische Naturforschende Gesellschaft: see Frankfurt.

Sharon Biological Laboratory, Sharon, Mass.

Shaw School of Botany: see Washington University.

Siena. R. Orto Botanico, Siena, Italy. *Bollettino.*

Singapore. Botanic Gardens, Singapore, Straits Settlements. *Annual Report.*

Smith College, Northampton, Mass. *Seed Lists.*

Smithsonian Institution, United States National Museum, Washington, D. C. *Report.*

Sociedad Broteriana, Jardin Botanico, Coimbra, Portugal. *Boletim.*

Society of American Florists: see America.

Society for Plant Morphology. *Publications.*

Society for the Preservation of Native Plants, Boston, Mass. *Leaflets.*

* Society for the Promotion of Agricultural Science. *Proceedings.*

Southern California Academy of Sciences, Los Angeles, Cal. *Bulletin.*

Springfield. Museum of Natural History, Springfield, Mass. *Bulletin.*

Springfield. Pleasure Driveway and Park District, Springfield, Ill. *Annual Report.*

Staten Island. Natural Science Association of Staten Island, New Brighton, S. I., N. Y. *Proceedings.*

Stockholm. Bergianska Trädgården: see Bergianska Trädgården.

Stockholm. Kongliga Vetenskaps-Akademien: see Sweden.

Stockholm. Högskolas Botaniska Institut, Stockholm, Sweden. *Meddelanden.*

Sweden. Kongliga Svenska Vetenskaps-Akademien, Stockholm, Sweden. *Archiv för Botanik.*

Swanley. Horticultural College, Swanley, England. *Report.*

Sydney. Botanic Gardens, Sydney, New South Wales. *Report.*

Sydney. Technological Museum, Sydney, New South Wales. *Publications.*

Texas Academy of Science, Austin, Texas. *Transactions.*

Texas. University of Texas, Austin, Texas. *Contributions from the Botanical Laboratory.*

Thüringischer Botanischer Verein, Weimar, Germany. *Mittheilungen.*

Tiflis. Jardin Botanique, Tiflis, Russia. *Travaux*, *Moniteur.*

Tirlemont. Hortus Thenensis, Tirlemont, Belgium. *Icones Selectae; Plantae Novae.*

Tōkyō Botanical Society, Tōkyō, Japan. *Botanical Magazine.*

Tōkyō. Imperial University, Botanic Garden, Tōkyō, Japan. *Seed Lists.*

Toronto. University of Toronto, Toronto, Canada. *Studies, Biological Series.*

Torrey Botanical Club, New York, N. Y. *Bulletin*, *Memoirs*, *Torreya.*

Trajectum: see Utrecht.

Triest. Museo Civico di Storia Naturale Ferdinando Massimiliano, Triest, Austria. *Seed Lists.*

‡ Trinidad. Royal Botanic Gardens, Trinidad, W. I. *Bulletin of Miscellaneous Information.*

Tromsø Museum, Tromsø, Norway. *Aarshefter.*

United States Department of Agriculture, Washington, D. C. *All publications.*

United States Department of Commerce and Labor, Washington, D. C. *Monthly Consular Reports.*

United States Geological Survey, Washington, D. C. *Bulletin; Monographs; Professional Papers.*

United States National Museum: see Smithsonian Institution, United States National Museum.

Upsala. Kgl. Universität, Upsala, Sweden. *Botanical reprints*, *Seed Lists.*

Utrecht. Hortus Botanicus Universitatis Rheno-Traiectinae, Utrecht, Holland. *Seed Lists.*

Valais. La Murithienne, Société Valaisanne des Sciences Naturelles, Sion, Valais, Switzerland. *Bulletin.*

Vermont State Board of Agriculture, Burlington, Vt. *Annual Report.*

Vick's Illustrated Monthly Magazine, Rochester, N. Y.

Victoria. Field Naturalists' Club of Victoria, Melbourne, Australia. *The Victorian Naturalist.*

* Vienna. K. K. Zoölogisch-Botanische Gesellschaft, Vienna, Austria. *Abhandlungen.*

‡ Vienna. K. K. Zoölogisch-Botanische Gesellschaft, Vienna, Austria. *Verhandlungen.*

Virginia. Department of Agriculture, Richmond, Va. *Annual Report.*

Wageningue. Ecoles Moyenne et Supérieure d'Horticulture de l'Etat, Wageningue, Holland. *Seed Lists.*

Warsaw. Jardin Botanique, Warsaw, Poland, Russia. *Seed Lists.*

Washington. Academy of Sciences, Washington, D. C. *Proceedings.*

Washington. Biological Society of Washington, Washington, D. C. *Proceedings.*

Washington. Library of Congress, Washington, D. C.

Washington. National Botanic Garden, Washington, D. C.

Washington University, St. Louis, Mo. *Contributions from the Shaw School of Botany.*

Weekly Florists Review, Chicago, Ill.

West American Scientist, San Diego, Calif.

West Indies. Agricultural Department, Barbadoes, W. I. *Bulletin*, *Agricultural News.*

West Indies. Inspectie van den landbouw in West Indië, Paramaribo, Dutch Guiana. *Bulletin*, *Verslag.*

West Java. Proefstation voor Suikerriet: see Java, Proefstation.

Wild Flower Preservation Society of America, Washington, D. C. *Circulars.*

Wisconsin Academy of Arts and Sciences, Madison, Wis. *Transactions.*

Wisconsin Natural History Society, Milwaukee Public Museum, Milwaukee, Wis. *Proceedings.*

Wisconsin. University of Wisconsin, Madison, Wis. *Bulletin.*

† Zeitschrift für Pflanzenkrankheiten, Stuttgart, Germany.

Zeitschrift für Physiologische Chemie, Strassburg, Germany.

* Zeitschrift für Wissenschaftliche Mikroskopie, Braunschweig, Germany.

Zoë, San Diego, Calif.

Zürich. Naturforschende Gesellschaft, Zürich, Switzerland. *Vierteljahrsschrift.*

REPORT OF THE HEAD GARDENER

To the Director-in-Chief.

Sir: I have the honor to submit herewith my report as Head Gardener for the year 1905.

The additional assistance given to me the past year has been of great service in the prosecution of curatorial work. It has thus been possible to check up all the collections and compare them with the card catalogue, so that this now becomes an index to the collections. A system of checking slips has been devised and put into operation. By a method of cross-references the accession books and the card catalogue become indices one to the other; this ensures the ready restoration of data if data-labels be defaced or entirely destroyed, excepting in extreme cases. The outdoor collections are checked up once and sometimes twice a year, spring and fall, and all missing data or labels supplied. The checking of the past fall revealed the loss of many of these labels, especially in the collections installed at the fruticetum and the deciduous arboretum. There is evidence that this trouble with the labels is the work of meddlers, and not due to natural causes, for frequently a portion of the label is missing, or the entire label is gone, leaving nothing but the wire, or in many cases wire and label are both gone; this last is pretty certain indication of human agency; it may become necessary, in the woody collections, to have plans locating the positions of the specimens, so that the data may be supplied from location.

Herbaceous Grounds. The arrangement of families here remains as it was last year. There have been grown the past year in this collection, including those at the trial grounds in the nursery, 2,950 species and varieties. It is especially desirable in this collection that no plants be incorporated until their names have been verified, so that a show-label may accompany each plant. For this reason all plants are retained at the trial grounds until this object can be accomplished.

Morphological Garden. There are in this collection 116 specimens. Show labels have been supplied, making the collection available for study purposes. These labels indicate the special feature which it is desired each plant shall illustrate, giving in addition the common name of the plant, this name agreeing with the one on the same species in the herbaceous collection in the immediate neighborhood. A larger topical sign is supplied for each bed, indicating the general feature illustrated by the plants.

Fruticetum. There have been 27 species and varieties, represented by 42 specimens, added to this collection by transferral from the nurseries. Specimens in the nurseries belonging to such families as were in the areas where construction work was in progress were not transplanted, as it was feared that the hauling entailed by construction might seriously injure or destroy them if placed in position now. There are at present in place in this collection 527 species and varieties, represented by 1,011 specimens. There are in the nurseries, in addition to these, 151, making a total of 678 species and varieties for the shrub collections. This is a slight decrease from the number of last year, due in great part to the death of some of the less hardy specimens which never fully recovered from the severe winter of 1903–4.

Salicetum. The collection of willows and poplars in the north meadows includes 45 species and varieties; there are 125 specimens in place.

Deciduous Arboretum. The collection here comprises, including those native to the tract and those in the nurseries, 249 species and varieties. In the arboretum alone there are 363 specimens, of which 22 were added during the past year. Here, as in the fruticetum, some of the less hardy plants succumbed to the severe weather referred to.

Pinetum. The area devoted to the conifers was considerably enlarged by the planting of the large knoll to the eastward of the conservatories; the collection of junipers was also increased by extending it to include the south corner of the conservatory terrace. This collection now embraces, includ-

ing those still at the nurseries, 254 species and varieties. In the pinetum alone there are 159 species and varieties, represented by 620 specimens, of which 215 were added the past year.

Viticetum. There are now 37 species and varieties of climbers, represented by 59 specimens, located here. There are some few specimens in the nurseries which can be incorporated with this collection, but the greater part of the material needed must be otherwise secured.

Conservatories. The arrangement of the collections here remains the same as indicated in my report of last year. Much work has been done in identifying unnamed specimens and in verifying or correcting names, thus permitting the placing of many more show labels. One of my assistants has charge of the details of this work, and herbarium specimens are being constantly made that this work may continue. In the collections there are 7,210 species and varieties, including such as are temporarily at the propagating houses.

The following list indicates the number of plants in each house, showing a total of 10,132:

House No.	1	280	House No.	9	133
"	2	642	"	10	579
"	3	336	"	11	315
"	4	379	"	12	946
"	5	1,889	"	13	600
"	6	808	"	14	705
"	7	758	"	15	980
"	8	782			

To make room for the growing orchid collection and to give the plants a more congenial atmosphere and light, a large proportion of this collection was removed to hanging bars in house no. 15.

Propagating Houses and Nurseries. The study collection of cactuses has been assembled in house no. 5, which is devoted almost entirely to these and to the stonecrop family. As in past years, one house, no. 4, has been devoted entirely to experimental work under the direction of Dr. MacDougal.

A portion of the nursery has also been set aside for such work, and has been properly guarded by placing a high wire fence around it.

Packets of seed to the number of 2,684 have been received. During the summer 500 packets of seed were collected, in great part of annuals, in order that such species may be perpetuated in the collections.

A rearrangement of the nurseries was started in the fall, and a large portion of the area devoted to deciduous woody plants was overhauled. Such material as could be transplanted to the systematic collections was thus disposed of. Of the remainder, such as was needed for decorative work or to safeguard the integrity of the systematic collections was retained; the surplus was disposed of by exchange or otherwise.

In the propagating houses there are now, excluding those in no. 4, 8,918 plants and 242 seed pans of seed. In the cold frames there are 1,070 plants.

In the nurseries there are 1,280 specimens of deciduous shrubs and trees; of conifers 920 specimens; and of herbaceous plants 3,000 specimens.

Labeling, Recording and Herbarium. The details of this work have been under the direction of two garden aids. Mr. Norman Taylor has had charge of it for the conservatory collection. In addition to this he has superintended the work done on the card catalogue, and all changes and corrections in names in the accession books have been made under his direction.

My other aid, Mr. W. W. Eggleston, has had charge of the same work for the outdoor collections. In addition to this he has had under his direction the accessioning of all material, both of seeds and plants.

Either three or four apprentices, varying at different times, have been employed in carrying out this work, under the immediate direction of the garden aids. Each aid attends to the labeling of the herbarium specimens relating to the collections under his control and to their proper incorporation in the herbarium of cultivated plants.

The following show labels have been manufactured and placed in position during the past year; a total of 5,050:

Herbaceous Grounds	1,831
Morphological Garden	124
Conservatories	2,789
Water-lily collection at Conservatories	67
Deciduous Trees	77
Pinetum	68
Experimental Grounds at Nurseries	94

The lead tree-label, to which reference was made in my report for 1904, continues to give satisfaction. For shrubs, and trees too small to receive the tree-label, this lead label is also used, modified by attaching it to a wooden back to which is affixed a wire standard, so that the label may be inserted in the ground in front of the specimen. In the case of trees, as soon as the specimen is of sufficient size to receive it, the lead face can be easily detached from the wooden back and affixed to the trunk of the tree, without alteration.

Accession numbers 21,950–24,512, inclusive, have been registered during the year, making a total of 2,563 accessions. The total number of plants derived from all sources has been 8,599, of which 253 were purchased, 859 donated, 1,470 collected, 732 acquired by exchange, 5,285 derived from seeds.

The herbarium of cultivated plants has been increased by 1,850 specimens, of which 1,050 are from the conservatory collection, and 800 from the outdoor collections. This herbarium becomes of increasing value as illustrating all species grown in any part of the Garden.

The following table gives the approximate number of species and varieties in each collection:

Conservatories	7,210
Herbaceous Grounds	2,950
Fruticetum	678
Deciduous Arboretum	249
Pinetum	254
Salicetum	45
Viticetum	37
	11,423

In addition to the above, and not yet represented in the systematic collections, or of such nature that they do not readily permit of cultivation, there are about 850 species growing wild within the grounds.

In the conservatory collection there are representatives of 200 families and 1,321 genera. As these collections are available at all times of the year, and as they are systematically grouped, they offer valuable facilities for study. In the herbaceous ground collection, which is available for study the greater part of the year, there have been represented the past year 79 families and 537 genera. In the fruticetum the collection embraces 50 families and 127 genera. The deciduous arboretum includes 23 families and 39 genera, and the pinetum 3 families and 20 genera. The salicetum, of course, has but 1 family and 2 genera. The viticetum illustrates 13 families and 15 genera.

General Horticultural Operations

This work has been done under the immediate direction of the second gardener, Mr. George A. Skene. The force available for the accomplishment of this work has comprised: one foreman-gardener, seventeen gardeners, nine apprentices, and at times thirteen or fourteen laborers. In addition to the above, one driver for his entire time and two during the mowing season were assigned to this department for the purposes of hauling and mowing.

Of the above force one foreman-gardener, nine gardeners (one in charge of the conservatory cellar), and six apprentices have been detailed to the conservatories; three gardeners and two apprentices to the propagating houses; and five gardeners and thirteen or fourteen laborers to the outside work.

The region to be maintained by the outdoor force was the past year divided into several tracts, a gardener in charge, with a number of laborers, being assigned to each tract. All gardening operations, including mowing, with the exception of horse-mowing, was performed by the force detailed to

each tract. This plan resulted in much more efficient work being accomplished. Three laborers were assigned to each gardener, with the exception of the fruticetum tract which had but one. A special detail was made for the care of the deciduous arboretum.

The tracts were defined as follows, and each gardener held responsible for the area under his charge: (1) *museum tract*, all that region between the road connecting the west end of the lake and the 200th Street entrance, and the road to the eastward of the museum extending as far south as the path north of the conservatories, and north to the lake; (2) *conservatory tract*, all that area to the southward of the museum tract to the south boundary, and included between the elevated railway approach and driving road on the west, and the road from the south gate north on the east; (3) *west border tract*, all that section lying to the westward of the museum and conservatory tracts and as far north as the lake; (4) *fruticetum tract*, all the region embraced in the fruticetum area including the west border and the salicetum in the north meadows; (5) *herbaceous grounds tract*, the region to the eastward of the museum and conservatory tracts and as far east as the woodland border, including the viticetum.

Late in the fall the gardeners were employed in the usual leaf-raking in various parts of the grounds; in top-dressing with manure of the surface wherever needed; and in tree-trimming and the removal of unsightly trees.

About 769 shrubs and trees were used in decorative planting. This material was used in planting the open spaces left in the west border and in the low woods east of the fruticetum when the trestle was removed; in the planting around the Mosholu Parkway approach; in the completion of the west border between the elevated railway approach and the 200th Street entrance; and for replacing such shrubs and trees as it was desirable to remove from other decorative plantations.

In the herbaceous grounds the low areas lying between the brook and the higher ground on the west side have been

filled in to a depth of several inches, the sod there having been previously removed and replaced after the filling. Drain pipes were also laid, thus improving the conditions and better adapting the soil at that point to the growing of herbaceous plants.

Personal Investigations

On July 6 I was granted leave of absence to continue my explorations in the Republic of Haïti. I left on that date, accompanied by an assistant, arriving again in New York on September 8. Finding it necessary to return to New York via Turks Islands, a stay of nine days was made at Grand Turk, where a collection was made; previous to this the collections at the Garden contained practically nothing from this island. A detailed account of this exploration appeared in the JOURNAL for November.

The study and identification of the collections of living plants have been continued. Further studies of a systematic nature have been carried on in the grass family.

GEORGE V. NASH,
Head Gardener.

REPORT OF THE SUPERINTENDENT OF GROUNDS

To the Director-in-Chief.

Sir: I have the honor to present the following as my report for the year 1905.

Buildings

Propagating house. The flat tin roof of the potting shed at the propagating house having been in an unsafe condition, some of the timber being rotted away, this roof has been taken off, the side walls raised about 2 feet, and 2 gables 10 feet high and a gable shingle roof put on with 4 bulkheads, 5 sashes and 1 door; the defective beams have been removed and replaced by new timber, and a yellow pine floor has been laid and a stairway built from the first floor. This modification provides a spacious attic, available for various purposes.

Stone hut. The structure has been put in repair, a concrete and cement floor put in, the roof repaired and made watertight and the old sash and shutters replaced by new ones.

Minor repairs were necessary at the power house, conservatories and stable.

A fence inclosing the stable yard, of which the posts were set in 1904, was finished and painted.

Construction of Roads and Paths

The main road to Williamsbridge on the west side of the river, in course of construction in the year of 1904, has been surfaced, rolled, and totally completed up to the north end of the lake bridge, and west of the museum to the N. Y. C. & H. R. R. R. station. Lamp-posts were set along the line by the Department of Parks and the road was opened for the use of the public on December 24. The road from the Newell Avenue entrance southward along the river to the long bridge has been graded, telford laid, and trap rock put on about one half of it. The road connecting the plaza near the stable with the east side of the long bridge has been

graded, telford laid, and stone broken about half way to the bridge; the excavation of rock now in progress will enable us to pave to the easterly entrance of this bridge early in the spring.

Paths. A path leading from the Mosholu Parkway approach to the Woodlawn Road bridge, and other paths on fruticetum plain, measuring in length 1,930 feet, 11 feet in width, have been completed.

A path east of the main road opposite the museum building leading in an easterly direction to the arbor, measuring about 700 feet in length, has been graded and part of the telford foundation laid.

The work on the paths in course of construction east of the herbaceous grounds running parallel with the road to the southerly border line has been taken up and about 500 feet of telford laid, stone broken and partly covered with screenings.

A service road has been built from the main road to the stable yard about 15 feet in width and 150 feet in length.

Regulating and Grading

Owing to the inclemency of the weather in January, February and a part of March, 1905, the surface being constantly covered with four inches of snow, and fifteen inches of frost in the ground, our work was mostly confined to the quarry in the rear of the museum; the stone produced fit for paving was hauled to the north end of the road east of the river, and the soft rock was heaped up at several points convenient for the building of paths.

Late in March we began to pave the roads at the junction near Newell Avenue, and used all the stone produced by the quarry and the breaking-up of stone fences.

On July 22, filling on the road at the easterly approach to the long bridge was taken up. The earth hauled by teams and carts to the long bridge and its approaches, to the approaches of the lake bridge and the grading of the road east of the river, not including the short hauls in the grading of

the northern part of this road, amounts to 10,528 cubic yards; earlier in the season 3,200 yards was hauled to the Mosholu Parkway approach, making a total of 13,728 cubic yards.

The surplus stone at the hillside northeast of the conservatories was quarried early in spring and hauled to the road east of the river; we graded and regulated the hill with one foot of topsoil and sodded the border of the path. This whole area was sown in the autumn.

The slopes and other places between the roads and paths on the fruticetum plain were regulated, sodded and sown, in so far as construction work has proceeded.

Drainage

Drainage having been almost completed on the improved areas, only two catch basins had to be constructed in addition to the 121 built previously; sodded gutters and temporary surface drainage were provided along the edges of the new roads and paths.

A six-inch drain pipe was laid at the low point of the new road and path northwest of the museum building near the railroad, connecting catch basins with the upper lake.

Water Supply

The six-inch supply line along and parallel with the main road north and south was laid from the north end of the lake bridge, to the south end of the lake and connected as a part of the contract for said bridge; we continued the line from the bridge northward, a length of 514 feet. A fire hydrant was put in and connected at the high point on this line and connections made with the one-inch pipe laid under the road previously.

The four-inch pipe connection between the west and east water main running parallel with the path north of the conservatories, which it was necessary to take up in order to grade said path and slope, was relaid for a length of 450 feet.

An addition of 80 feet of one-inch pipe was made to the line parallel to the road at the nursery.

Miscellaneous

Early in May, as soon as the weather permitted, men were put at work to take out the cement and stone foundation where the temporary trestle crossed the river; it was a difficult task, as men had to work in at least 18 inches of water most of the time.

The contract work of the Anchor Post Iron Works Company, in supplying and setting guard-rails, was started August 9, and completed about the middle of October; the complete work amounted to $2{,}336\frac{8}{12}$ feet in length.

After May 1 we employed four special guards in addition to the regular guards on Sundays and holidays up to September 30, but owing to the extension of new roads and the improvements on the fruticetum and other places this number of guards will be insufficient for the coming season.

The stable and its equipments are in fair condition; the roof requires repairs early in spring. The horses are all in good health; the hay crop of last summer amounted to about 18 tons of good fodder, but I fear it will not be sufficient to last until the next crop can be used.

A report on lamp posts, asked for by the city authorities, showed 101 naphtha and 9 gas lights in the garden at that time, to which 22 naphtha lights were added and put up along the main road from the lake to Newell Avenue in December, making a total of 132 lights.

In May, two road men were assigned by the Park Department to keep the roads and paths in order, but owing to the opening of the main road to Newell Avenue at least an additional man will be required.

Respectfully submitted,

F. A. SCHILLING,
Superintendent of Grounds.

SCHEDULE OF EXPENDITURES DURING 1905, UNDER APPROPRIATIONS MADE BY THE BOARD OF MANAGERS

1. CITY MAINTENANCE ACCOUNT		$70,000.00
Salaries and Labor		
Appropriated	56,653.71	
Expended	56,653.71	
Supplies and Repairs		
Appropriated	13,346.29	
Expended	13,346.29	
Total Expended		70,000.00
2. CONSTRUCTION AND EQUIPMENT		37,617.16
Salaries and Labor		
Appropriated	25,886.79	
Expended	25,886.79	
Sundry Expenses		
Appropriated	11,730.37	
Expended	11,730.37	
Total Expended		37,617.16

3. GARDEN ACCOUNTS

Museums and Herbarium		
Appropriated	2,400.00	
Transferred from Labor	500.00	
Transferred from Publications	600.00	
Transferred from Grading, Drainage and Water Supply	150.00	3,650.00
Expended		3,649.15
Balance		.85
Library		
Appropriated	1,200.00	
Transferred from Labor	500.00	

Transferred from Grading, Drainage and Water Supply	250.00	
Refund on Binding..............................	1.25	1,951.25
Expended	1,700.25	
Transferred to Purchase of Plants	50.00	
Transferred to Labor..............................	200.00	1,950.25
Balance		1.00

Laboratories

Appropriated..	1,500.00	
Transferred from Grading, Drainage and Water Supply............................	125.00	1,625.00
Expended	1,317.09	
Transferred to Labor...........................	300.00	1,617.09
Balance..........................		7.91

Publications (Income of Lydig Fund)

Appropriated.............	1,400.00	
Subscriptions to North American Flora.....	114.80	1,514.80
Expended.......................		1,484.88
Balance..........................		29.92

Publications (General Fund)

Appropriated...........	1,400.00	
Transferred from Labor........................	500.00	1,900.00
Expended..................................	1,270.79	
Transferred to Museums and Herbarium.....	600.00	
Transferred to Lectures........................	10.00	1,880.79
Balance..		19.21

Lectures and Announcements

Appropriated..	600.00	
Transferred from Publications................	10.00	610.00
Expended	455.44	
Transferred to Labor............................	150.00	605.44
Balance............................		4.56

Horticultural Prizes

Appropriated		400.00
Expended	241.00	
Transferred to Labor	100.00	
Transferred to Resident Research Scholarships	50.00	391.00
Balance		9.00

Investigations at Other Institutions

Appropriated	800.00	
Transferred from Labor	500.00	1,300.00
Expended	1,270.36	
Transferred to Resident Research Scholarships	25.00	1,295.36
Balance		4.64

Exploration and Collecting

Appropriated	4,000.00	
Transferred from Labor	500.00	
Refunds—Unexpended Balances	335.48	4,835.48
Expended		4,831.41
Balance		4.07

Resident Research Scholarships

Appropriated	500.00	
Transferred from Investigations at other Institutions	25.00	
Transferred from Horticultural Prizes	50.00	575.00
Expended		575.00

Editorial Assistance

Appropriated	600.00
Expended	600.00

Expenses of Consulting Chemist

Appropriated	300.00
Expended	300.00

Preservation of Native Plants (Income of Stokes Fund)

Appropriated		100.00
Expended		44.53
Balance		55.47

Aid for Students Research (Income of Students Research Fund)

Appropriated		200.00
Expended		100.00
Balance		100.00

Photography

Appropriated	400.00	
Transferred from Labor	250.00	650.00
Expended		615.20
Balance		34.80

Contingent Fund

Appropriated		2,500.00	
Refund Expressage (ac. C. E. Tefft)	72.00		
Refund Glass Broken	1.00	73.00	2,573.00
Expended			2,255.97
Balance			317.03

Purchase of Plants

Appropriated	500.00	
Transferred from Library	50.00	
Transferred from Insurance	15.00	565.00
Expended		564.01
Balance		.99

Circulars for Membership

Appropriated		800.00
Expended	696.46	
Transferred to Labor	100.00	796.46
Balance		3.54

Landscape Engineering

Appropriated		720.00
Expended		720.00

Insurance

Appropriated		500.00
Expended	477.00	
Transferred to Purchase of Plants	15.00	492.00
Balance		8.00

Assistance for Treasurer

Appropriated		150.00
Expended		150.00

Labor

Appropriated	3,500.00	
Transferred from Library	200.00	
Transferred from Laboratories	300.00	
Transferred from Lectures	150.00	
Transferred from Horticultural Prizes	100.00	
Transferred from Circulars for Membership	100.00	4,350.00
Expended	1,577.34	
Transferred to Museums and Herbarium	500.00	
Transferred to Library	500.00	
Transferred to Publications	500.00	
Transferred to Investigations at other Institutions	500.00	
Transferred to Exploration and Collecting	500.00	
Transferred to Photography	250.00	4,327.34
Balance		22.66

Grading, Drainage and Water Supply

Appropriated		4,000.00
Expended	2,685.17	
Transferred to Museums and Herbarium	150.00	
Transferred to Library	250.00	
Transferred to Laboratories	125.00	3,210.17
Balance		789.83

Total Appropriated for Garden Accounts	28,470.00	
Subscriptions (Income of Lydig Fund)	114.80	
Refunds	409.73	28,994.53
Total Expended for Garden Accounts		27,581.05
Balance		1,413.48

4. Special Garden Accounts

Conservatory Fund

Subscribed 1900	2,110.00	
Subscribed 1901	25.00	
Refund — Balance on Draft	15.27	
Subscribed 1902	486.55	
Refund — Unexpended Balance	9.70	
Subscribed 1903	200.00	
Sale of Duplicate Palms	100.00	
Sale of Plants	78.00	
Sale of Palms 1904	125.00	3,149.52
Expended 1900	710.44	
Expended 1901	1,437.42	
Expended 1902	404.41	
Expended 1903	447.66	
Expended 1904	121.21	3,121.14
Balance		28.38

Museum and Herbarium Fund

Subscribed 1901	1,800.00	
Subscribed 1902	655.00	
Refund (Advance Charges on Specimens, account of R. S. Williams)	131.09	
Subscribed 1903	1,405.00	
Sale of Specimens	29.50	
Subscribed 1904	100.00	4,120.59
Expended 1901	1,546.19	
Expended 1902	1,024.96	
Expended 1903	1,437.63	
Expended 1904	100.00	4,108.78
Balance		11.81

Exploration Fund

Subscribed 1901	2,050.00	
Refund — Balance on Drafts	87.59	
Subscribed 1902	2,130.00	
Refund — Unexpended Balance	180.56	
Subscribed 1903	1,565.00	
Refunds — Unexpended Balances	275.11	

Subscribed 1904	3,183.45	
Refunds — Unexpended Balances	110.50	
Subscribed 1905	2,575.00	
Sale of Duplicate Palms	100.00	
Refund — Part of Expenses — Exploration to the Bahamas	125.00	12,382.21
Expended 1901	2,130.95	
Expended 1902	1,258.32	
Expended 1903	2,880.72	
Expended 1904	2,878.28	
Expended 1905	3,003.37	12,151.64
Balance		230.57

Special Book Fund

Subscribed 1899	4,950.00	
Subscribed 1901	1,825.00	
Subscribed 1902	2,265.00	
Subscribed 1903	1,315.00	
Special Contribution from Mr. Andrew Carnegie	1,997.88	
Sale of Books	59.60	
Refund — Balance on Drafts	20.93	
Subscribed 1904	1,540.00	
Sale of Duplicate Books	15.15	
Subscribed 1905	2,175.00	
Sale of Duplicate Books	25.50	16,189.06
Expended 1899	1,916,65	
Expended 1900	2,395.28	
Expended 1901	2.463.02	
Expended 1902	2,256.25	
Expended 1903	3,397.75	
Expended 1904	1,031.92	
Expended 1905	2,183.09	15.643.96
Balance		545.10
Total Expended from Funds of the Garden..		32,767.51

WALTER S. GROESBECK,
Accountant.

E. & O. E.

NEW YORK, January 8, 1906.

REPORT OF THE SCIENTIFIC DIRECTORS

To the Board of Managers of the New York Botanical Garden.

Gentlemen: The Scientific Directors would report some changes in the scientific staff of the Garden owing to the departure of Dr. D. T. MacDougal to become the Director of Botanical Research in the Carnegie Institution. The work of the assistant director has been divided, Dr. William A. Murrill becoming First Assistant and having charge of various matters of administration, while Dr. C. S. Gager has been chosen Director of the Laboratories. The board feels that this rearrangement of duties will be eminently satisfactory. Some progress has been made in the plans for the statues with which it is hoped eventually to honor the fathers of botanical science in New York. We feel that when these are erected nothing should be spared to make them in every sense worthy their subjects, even if it delay the time when they can be provided.

We would report excellent progress in botanical exploration in Bermuda and the Bahamas by the Director, in the Philippines by Mr. Williams, in Haiti by Mr. Nash and in Utah by Dr. Rydberg. It is believed that in the case of the larger islands like Haiti, which are especially difficult for exploration, expeditions on a larger scale should be planned, and we would urge the desirability of having means provided that would enable us to obtain more immediate and proportionately greater results than would be possible under a number of smaller expeditions penetrating only a short distance into the margins of the island. This is especially important in view of the monographic work on the North American flora now in progress. In the matter of publication we are able to report the successful commencement of the North American Flora in the issue of two royal octavo parts. It is planned to continue this at the rate of four or five parts a year or as rapidly as material can be supplied for the work.

The parts already issued represent a high grade of work and reflect great credit on the able staff of scientific workers connected with the Garden.

Means for the preparation and publication of botanical illustration of the highest order of scientific and artistic merit are greatly needed to supplement this descriptive work on the American flora. The position of the Garden demands that nothing short of the best should be issued in every publication bearing its imprint. Even if more slowly laid, the foundations should be securely laid for work that shall endure.

Deeming it desirable to have a closer acquaintance with the scientific work carried on at the Garden, the board have decided hereafter to hold stated meetings on the second Saturdays of April, June, October and December. This will enable the members to be in closer touch with the scientific activities of the Garden and better enable them to act wisely on matters calling for their action.

Respectfully submitted,

Lucien M. Underwood,

Chairman of Scientific Directors.

January 8, 1906.

REPORT OF THE COMMITTEE ON PATRONS, FELLOWS, AND MEMBERS

To the Board of Managers of the New York Botanical Garden.

Gentlemen: The number of new members who have qualified during the past year is 63. The number of annual members is now 932, life members 168, sustaining members 23, fellowship members, 6.

Of these 30 are now in arrears for dues for 1905, 17 are in arrears for 1904 and 1905, and 4 are in arrears for 1903, 1904 and 1905.

Annual dues have been collected to the amount of $9,560, which has been transmitted to the Treasurer as received.

Three persons have qualified as fellows for life by the payment of $1,000 each. Twelve persons have qualified as life members by the payment of $100 each. These sums have been transmitted to the Treasurer for credit to the Endowment Fund.

Six persons have qualified as fellowship members, and twenty-three persons have qualified as sustaining members. Their fees aggregating $1,250 have been transmitted to the Treasurer as received.

A complete list of all classes of members to date is herewith submitted.

New York, January 8, 1906.

Benefactors

Hon. Addison Brown,
Andrew Carnegie,
Columbia University,
* Hon. Chas. P. Daly,
D. O. Mills,
J. Pierpont Morgan,
John D. Rockefeller,
* Cornelius Vanderbilt.

Patrons

Mrs. Geo. Whitfield Collord,
* James M. Constable,
* Hon. Chas. P. Daly,
* Wm. E. Dodge,
Geo. J. Gould,
Miss Helen M. Gould,
Mrs. Esther Herrman,
John S. Kennedy,

* Deceased.

* Oswald Ottendorfer,
William Rockefeller,
* Wm. C. Schermerhorn,
Jas. A. Scrymser,
Samuel Sloan,
Mrs. Antoinette Eno Wood.

FELLOWS FOR LIFE

James B. Ford,
Morris K. Jesup,
John Innes Kane,
Hon. Seth Low,
M. F. Plant,
Francis Lynde Stetson,
Miss Caroline Phelps Stokes,
Miss Olivia E. Phelps Stokes,
Samuel Thorne,
Tiffany & Co.,
H. C. von Post.

LIFE MEMBERS

Edward D. Adams,
Dr. Felix Adler,
A. G. Agnew,
Miss A. G. Agnew,
Mrs. James Herrman Aldrich,
Richard H. Allen,
Bernard G. Amend,
Constant A. Andrews,
J. Sherlock Andrews,
Wm. A. Anthony,
Dr. S. T. Armstrong,
Mrs. H. D. Auchincloss,
Samuel P. Avery, Jr.,
Samuel D. Babcock,
Geo. V. N. Baldwin,
Dr. John Hendley Barnhart,
Gustav Baumann,
Samuel R. Betts,
Miss Elizabeth Billings,
Miss Mary M. Billings,
J. O. Bloss,
George Blumenthal,
George C. Boldt,
G. F. Bonner,
Geo. S. Bowdoin,
J. Hull Browning,
Miss Matilda W. Bruce,
Joseph Bushnell,
T. Morris Carnegie,
Frank R. Chambers,
Hugh J. Chisholm,
Hugh J. Chisholm, Jr.,
E. Dwight Church,
Geo. C. Clark,
Banyer Clarkson,
Wm. F. Cochran,
William Colgate,
Miss Georgette T. A. Collier,
Mrs. William Combe,
W. E. Connor,
Wm. L. Conyngham,
Theodore Cooper,
Zenas Crane,
R. N. Cranford,
Melville C. Day,
Mrs. John Ross Delafield,
Miss Julia L. Delafield,
Maturin L. Delafield, Jr.,
Anthony Dey,
W. B. Dickerman,
James Douglas,
Miss Josephine W. Drexel,
Miss Ethel DuBois,
Miss Katharine DuBois,
Wm. A. DuBois,
Geo. E. Dunscombe,

* Deceased.

Mrs. John Dwight,
Thomas Dwyer,
Newbold Edgar,
George Ehret,
David L. Einstein,
Ambrose K. Ely,
Amos F. Eno,
Edward J. Farrell,
Andrew Fletcher,
Chas. R. Flint,
Henry C. Frick,
Mrs. Theodore Kane Gibbs,
James J. Goodwin,
Daniel Guggenheimer,
Bernard G. Gunther,
Franklin L. Gunther,
Frederic R. Halsey,
Chas. J. Harrah,
Dr. Louis Haupt,
H. O. Havemeyer,
R. Somers Hayes,
James J. Higginson,
George B. Hopkins,
Samuel N. Hoyt,
Gen. Thos. H. Hubbard,
Arthur M. Huntington,
Frank D. Hurtt,
James H. Hyde,
Adrian Iselin,
Mrs. Columbus O'D. Iselin,
Theo. F. Jackson,
Dr. Walter B. James,
Dr. E. G. Janeway,
Miss Annie B. Jennings,
Walter R. T. Jones,
Eugene Kelly, Jr.,
Nathaniel T. Kidder,
William M. Kingsland,
H. R. Kunhardt,
W. B. Kunhardt,
Charles Lanier,
W. V. Lawrence,
Meyer H. Lehman,
Mrs. George Lewis,
Joseph Loth,
David Lydig,
C. W. McAlpin,
Wm. H. Macy, Jr.,
Mrs. William H. Macy, Jr.,
Alexander Maitland,
Dr. Francis H. Markoe,
Louis Marshall,
Edgar L. Marston,
Bradley Martin,
Dr. Geo. N. Miller,
A. G. Mills,
Roland G. Mitchell,
John G. Moore,
Hon. Levi P. Morton,
Sigmund Neustadt,
A. Lanfear Norrie,
Gordon Norrie,
Geo. M. Olcott,
Mrs. Chas. Tyler Olmstead,
Wm. Church Osborn,
Lowell M. Palmer,
Henry Parish,
Geo. Foster Peabody,
Wm. Hall Penfold,
Geo. W. Perkins,
W. H. Perkins,
Mrs. Henry C. Potter,
James Tolman Pyle,
M. Taylor Pyne,
Geo. W. Quintard,
J. C. Rodgers,
H. H. Rogers,
Jacob Rubino,
Thomas F. Ryan,
Wm. R. Sands,

Reginald H. Sayre,
Edward C. Schaefer,
Jacob H. Schiff,
Mortimer L. Schiff,
Grant B. Schley,
Mrs. I. Blair Scribner,
Isaac N. Seligman,
Geo. Sherman,
William D. Sloane,
James Speyer,
Anson Phelps Stokes,
Miss Ellen J. Stone,
Albert Tag,
Paul G. Thebaud,
Charles G. Thompson,
Robert M. Thompson,
Miss Phebe Anna Thorne,
William Thorne,
Wm. Stewart Tod,
Spencer Trask,
Miss Susan Travers,
Miss Anna Murray Vail,
F. T. Van Beuren,
Dr. Henry Freeman Walker,
F. N. Warburg,
John I. Waterbury,
Miss Emily A. Watson,
S. D. Webb,
Dr. W. Seward Webb,
Mrs. Joseph M. White,
John D. Wing,
Charles T. Yerkes.

Fellowship Members

George A. Archer,
Mr. Farquhar Ferguson,
George Foster Peabody,
Geo. W. Perkins,
Mortimer L. Schiff,
Wm. D. Sloane.

Sustaining Members

Miss Elizabeth Billings,
Temple Bowdoin,
Dr. N. L. Britton,
T. Morris Carnegie,
Chas. F. Cox,
D. Stuart Dodge,
James Douglas,
Wm. B. Osgood Field,
Wm. H. Fischer,
John Greenough,
L. A. Heinsheimer,
O. H. Kahn,
Prof. Morris Loeb,
Franklin B. Lord,
Rev. Haslett McKim,
Arthur M. Mitchell,
Jacob Mahler,
Quincy L. Morton,
Mrs. Edwin Parsons,
Auguste Richard,
T. G. Sellew,
Rev. J. Henry Watson,
John T. Willets.

Annual Members

Dr. Robert Abbe,
Fritz Achelis,
Ernest R. Ackerman,
Samuel Adams,
Dr. I. Adler,
Mrs. Cornelius R. Agnew,
John E. Alexandre,
J. H. Alexandre,
G. Amsinck,
John A. Amundson,

Ernest J. H. Amy,
A. J. C. Anderson,
J. M. Andreini,
A. B. Ansbacher,
John D. Archbold,
Francis J. Arend.
Reuben Arkush,
Mrs. H. O. Armour,
Dr. Edmund S. F. Arnold,
Francis B. Arnold,
Col. John Jacob Astor,
Hugh D. Auchincloss,
John W. Auchincloss,
Marshal L. Bacon,
James A. Bailey,
Pearce Bailey,
Frederic Baker,
Geo. F. Baker,
Stephen Baker,
Frederick H. Baldwin,
Mrs. Thos. R. Ball,
Robert F. Ballantine,
Theodore M. Banta,
Henry I. Barbey,
E. W. Barnes,
John S. Barnes,
Mrs. Mildred Barnes,
Chas. T. Barney,
Wm. M. Barnum,
William Barr,
Geo. D. Barron,
E. W. Bass,
Chas. Batchelor,
Mrs. N. E. Baylies,
Alfred N. Beadleston,
Wm. R. Beal,
Dr. C. Adelbert Becker,
Gerard Beekman,
M. H. Beers,
Dennistonn M. Bell,
August Belmont,
Perry Belmont,
James H. Benedict,
L. L. Benedict,
James Gordon Bennett,
Jno. R. Bennett,
Frank Sherman Benson,
Chas. M. Bergstresser,
Gustav Bernheim,
Mrs. Adolph Bernheimer,
Chas. L. Bernheimer,
Simon E. Bernheimer,
Philip Berolzheimer,
Edward J. Berwind,
Henry Beste,
Albert S. Bickmore,
Eugene P. Bicknell,
Mrs. Sylvan Bier,
L. Horatio Biglow,
Isaac Bijur,
W. H. Birchall,
Francis C. Bishop,
H. R. Bishop,
James C. Bishop,
Karl T. F. Bitter,
Mrs. D. C. Blair,
Mrs. Birdseye Blakeman,
Samuel Blatchford,
Mrs. S. A. Blatchford,
Cornelius N. Bliss,
Ernest C. Bliss,
E. W. Bliss,
Miss S. D. Bliss,
Jno. H. Bloodgood,
Lyman G. Bloomingdale,
Mrs. Edward C. Bodman,
Henry W. Boettger,
Edward C. Bogert,
Frank S. Bond,
Hon. H. W. Bookstaver,

I. Boskowitz,
Frederick G. Bourne,
John M. Bowers,
James B. Brady,
E. T. Bragaw,
Michael Brennan,
Miss Cornelia G. Brett,
Mrs Benjamin Brewster,
Elbert A. Brinckerhoff,
Chas. Astor Bristed,
Jno. I. D. Bristol,
Mrs. Harriet Lord Britton,
Mrs. Kate M. Brookfield,
Mrs. H. D. Brookman,
Edwin H. Brown,
Miss E. W. Brown,
John Crosby Brown,
M. Bayard Brown,
Robert I. Brown,
W. L. Brown,
W. P. Brown,
F. W. Bruggerhof,
H. B. Brundrett,
Miss Mary T. Bryce,
Mrs. William Bryce,
William Bryce, Jr.,
W. Buchanan,
Albert Buchman,
Edwin M. Bulkley,
W. L. Bull,
H. C. Bumpus,
James A. Burden, Jr.,
Edward G. Burgess,
Miss Helen C. Butler,
Wm. H. Butler,
Mrs. Daniel Butterfield,
John L. Cadwalader,
H. A. Caesar,
Albert Calman,
Henry L. Calman,
W. L. Cameron,
H. H. Cammann,
Henry L. Cammann,
Miss Isabella M. Cammann,
Richard A. Canfield,
H. W. Cannon,
Mrs. Miles B. Carpenter,
H. T. Cary,
Chas. L. Case,
John W. Castree,
John H. Caswell,
John R. Caswell,
Robert Caterson,
Miss Jennie R. Cathcart,
Prof. J. McK. Cattell,
Mrs. Geo. H. Chatillon,
J. E. Childs,
B. Ogden Chisolm,
Geo. E. Chisolm,
Mrs. Wm. E. Chisolm,
Jared Chittenden,
Wm. G. Choate,
Mrs. Helen L. Chubb,
Theodore W. Church,
John Claflin,
C. A. S. Clark,
D. Crawford Clark,
J. Mitchell Clark,
W. A. Clark,
George C. Clausen,
Wm. P. Clyde,
Dr. Wm. J. Coates,
John W. Cochrane,
Miss Mary F. Cockcroft,
Hon. W. Bourke Cockran,
Mrs. Ogden Codman,
C. A. Coffin,
Edmund Coffin,
E. W. Coggeshall,
Samuel M. Cohen,

N. A. Colburn,
Mrs. James B. Colgate,
P. F. Collier,
F. Collingwood,
Miss Ellen Collins,
Mrs. Minturn Post Collins,
Stacy Budd Collins,
Miss Mary Compton,
T. G. Condon,
Henry C. Conger,
Roland R. Conklin,
C. T. Cook,
Mrs. C. T. Cook,
Henry H. Cook,
Hon. Edward Cooper,
Mrs. Austin Corbin,
C. R. Corning,
Mrs. Charles Henry Coster,
Miss Ellen H. Cotheal,
Winthrop Cowdin
Clarkson Cowl,
Mark T. Cox,
Geo. F. Crane,
Jonathan H. Crane,
Mrs. Jonathan H. Crane,
Mrs. Agnes Huntington Cravath,
Thos. Crawford,
Dr. W. H. Crawford,
H. G. Crickmore,
John D. Crimmins,
Geo. A. Crocker,
Frederic Cromwell,
Jas. W. Cromwell,
Chas. H. Cronin,
Edwin A. Cruikshank,
Guy W. Culgin,
Chas. Curie,
R. Fulton Cutting,
W. Bayard Cutting,
C. H. Dale,
Henry Dalley,
Wm. B. Dana,
Geo. H. Daniels,
Mrs. Ira Davenport,
J. Clarence Davies,
Julien T. Davies,
Wm. Gilbert Davies,
John H. Davis,
Clarence S. Day,
Mrs. Henry Mills Day,
E. J. de Coppet,
H. de Coppet,
Richard Deeves,
Dr. Robert W. de Forest,
Mrs. Robert W. de Forest,
Mrs. Courtnay De Kalb,
B. F. DeKlyn,
Eugene Delano,
Wm. C. Demorest,
John B. Dennis,
Charles de Rham,
Walter D. Despard,
F. W. Devoe,
Chas. D. Dickey,
Geo. H. Diehl,
Chas. F. Dieterich,
Miss Mary A. Dill,
Mrs. Henry F. Dimock,
Rev. Morgan Dix,
Cleveland H. Dodge,
Miss Grace H. Dodge,
Norman W. Dodge,
Mrs. Wm. E. Dodge,
Peter Doelger,
C. W. Doherty,
L. F. Dommerich,
Henry Dorscher,
Mrs. George William Douglas,
Alfred Douglass,
R. D. Douglass,

Mrs. David Dows,
Tracy Dows,
B. Ferdinand Drakenfield,
Mrs. Henry Draper,
Isaac W. Drummond,
Matthew B. DuBois,
Carroll Dunham,
Dr. Edward K. Dunham,
George H. Dunham,
E. B. Dunne,
James Dunne,
H. A. Dupont,
J. B. Dutcher,
D. Edgar,
Miss Laura Jay Edwards,
Edward Ehrlich,
Henry G. Eilsheimus,
August Eimer,
Emanuel Einstein,
Mrs. Matilda A. Elder,
Louis A. Elridge,
Roswell Elridge,
Geo. W. Ellis,
John W. Ellis,
J. M. Ellsworth,
John J. Emery,
C. Temple Emmet,
Robert Temple Emmet,
Robert Endicott,
Ad. Engler,
Jno. C. Eno,
R. Erbsloh,
Arthur F. Estabrook,
Louis Ettlinger,
Richard Evans,
H. C. Fahnestock,
Chas V. Faile,
Chas. S. Fairchild,
Samuel W. Fairchild,
Jas. C. Fargo,
Pliny Fisk,
E. W. Fitch,
Harry Harkness Flagler,
Isaac D. Fletcher,
Miss Helena Flint,
A. R. Flower,
James D. Foot,
Scott Foster,
Henry E. Frankenberg,
Werner V. Frankenberg,
Alfred Fraser,
Mrs. George S. Fraser,
A. S. Frissell,
E. A. Funke,
W. F. Gade,
Geo. F. Gantz,
John A. Garver,
Joseph E. Gay,
Mrs. James Gayley,
Frederick Gebhard,
Mrs. Walter Geer,
Thos. Ghee,
John J. Gibbons,
Mrs. Hervey de Blois Gibson,
R. W. Gibson,
J. Waldron Gillespie,
Frederick N. Goddard,
Mrs. Edwin L. Godkin,
S. L. Goldenberg,
Samuel Goodman,
Chas. Gotthelf,
Chas. A. Gould,
Edwin Gould,
Robert D. Graham,
Henry Graves,
John Clinton Gray,
Ernest F. Greeff,
Edward C. Gregory,
Isaac J. Greenwood,
Rev. David H. Greer,

Daniel J. Griffith,
E. Morgan Grinnell,
C. A. Griscom, Jr.,
William Guggenheim,
W. C. Gulliver,
Miss Delia L. Gurnee,
W. S. Gurnee, Jr.,
Dr. Alexander Hadden,
John A. Hadden, Jr.,
J. and M. Haffen,
James D. Hague,
Henry F. Haines,
Hon. Ernest Hall,
Wm. Halls, Jr.,
Miss Laura P. Halsted,
Wm. Hamann,
Miss Katherine L. Hamersley,
Louis Gordon Hamersley,
Miss Adelaide Hamilton,
Jas. B. Hammond,
Chas. T. Harbeck,
Anson W. Hard,
J. Montgomery Hare,
E. S. Harkness,
E. H. Harriman,
Oliver Harriman,
S. W. Harriot,
Allan C. Harris,
William Hamilton Harris,
Miss Rebecca Harvey,
Jacob Hasslacher,
Dr. Valery Havard,
F. C. Havemeyer,
J. C. Havemeyer,
T. A. Havemeyer,
G. G. Haven,
J. Woodward Haven,
Matthew Hawe,
E. Hawley,
Frederick W. Haynes,
Arthur H. Hearn,
Wm. W. Heaton,
John G. Heckscher,
Arthur P. Heinze,
Clemens Heitemeyer,
Homer Heminway,
Chas. R. Henderson,
Chas. Henderson & Son,
Edmund Hendricks,
Harmon W. Hendricks,
Ferdinand Hermann,
Selmar Hess,
H. H. Hewitt,
Mrs. Sarah A. Hewitt,
Mrs. Daniel M. Hildreth,
George D. Hilyard,
Walter Hinchman,
Wm. K. Hinman,
Chas. S. Hirsch,
J. Oakley Hobby,
B. Hochschild,
George F. Hodgmann,
Alfred G. Hoe,
Richard M. Hoe,
Mrs. Richard March Hoe,
Mrs. Robert Hoe,
John Swift Holbrook,
E. B. Holden,
E. R. Holden,
Miss Virginia Hollins,
Henry Holt,
Joseph Honig,
William W. Hoppin,
Frederick B. House,
Wm. P. Howe,
M. D. Howell,
Gerald L. Hoyt,
Alex. C. Humphreys,
Miss Mary Duane Humphreys,
Mrs. C. P. Huntington,

Mrs. Robert P. Huntington,
Adolph G. Hupfel,
Frank Hustace,
John S. Huyler,
Clarence M. Hyde,
Frederick E. Hyde, Jr.,
Henry Iden, Jr.,
Mrs. Samuel Inslee,
John B. Ireland,
Adrien Iselin, Jr.,
C. Oliver Iselin,
Miss Georgine Iselin,
William E. Iselin,
Samuel Isham,
Wm. B. Isham,
Wm. M. Ives,
Frederic Wendell Jackson,
Dr. Abram Jacobi,
A. C. James,
D. Willis James,
Dr. Robert C. James,
O. G. Jennings,
Walter Jennings,
Mrs. Maria de W. Jesup,
Adrian H. Joline,
Dwight A. Jones,
Mrs. John D. Jones,
Mrs. Townsend Jones,
Jos. L. Kahle,
Louis Kahn,
Miss Louise Langdon Kane,
S. Nicholson Kane,
Theo. Kauffeld,
Mrs. H. F. Kean,
Frank Browne Keech,
Mrs. Chas. Kellogg,
Thos. H. Kelly,
Prof. J. F. Kemp,
H. Van Rensselaer Kennedy,
Mrs. Elizabeth Kenyon,
Rudolph Keppler,
Mrs. Catherine L. Kernochan,
John B. Kerr,
Geo. A. Kessler,
A. P. Ketchum,
W. Keuffel,
Wm. Kevan,
Samuel K. Keyser,
Patrick Kiernan,
S. E. Kilner,
Alfred R. Kimball,
David H. King, Jr.,
Le Roy King,
M. K. King,
William F. King,
Gustave E. Kissel,
A. Julian Klar,
Herman Knapp,
Chas. Kohlman,
Wm. Krafft,
H. C. Kudlick,
Julius G. Kugelman,
Percival Kühne,
Adolf Kuttroff,
William M. Laffan,
Rev. Anthony Lammel,
Francis G. Landon,
Edward V. Z. Lane,
Woodbury Langdon,
Woodbury G. Langdon,
J. Langeloth,
Dr. G. Langmann,
Lewis H. Lapham,
M. J. Lavelle,
John Burling Lawrence,
Mrs. Lydia G. Lawrence,
Mrs. Samuel Lawrence,
J. D. Layng,
Charles N. Lee,
Prof. Frederic S. Lee,

Mrs. Frederic S. Lee,
Marshall C. Lefferts,
Wm. H. Lefferts,
Emanuel Lehman,
Lemcke & Buechner,
Edward A. Le Roy, Jr.,
Arthur L. Lesher,
Dr. A. Monae Lesser,
Wm. H. Leuppe,
Emil Levi,
Julius Levine,
Emanuel Levy,
Mrs. John V. B. Lewis,
Albert Lewisohn,
Miss Alice Lewisohn,
Philip Lewisohn,
O. B. Libbey,
Lowell Lincoln,
Frederick J. Lisman,
Wm. S. Livingston,
Wm. C. Lobenstine,
Luke A. Lockwood,
James Loeb,
Walter S. Logan,
Henry Lomb,
P. Lorillard, Jr.,
R. P. Lounsberry,
C. Adolphe Low,
Miss Carlotta R. Lowell,
Mrs. Charles Russell Lowell,
Thomas Lowry,
Charles H. Ludington,
August Lueder,
Walther Luttgen,
Mrs. Alida McAlan,
Geo. L. McAlpin,
John A. McCall,
Mrs. W. H. McCord,
John J. McCook,
John A. McKim,
Guy R. McLane,
James McLean,
Geo. R. MacDougall,
J. W. Mack,
Clarence H. Mackay,
D. E. MacKenzie,
Malcolm MacMartin,
Mrs. Chas. A. Macy, Jr.,
V. Éverit Macy,
F. Robert Mager,
J. H. Maghee,
Chas. Mallory,
Howard Mansfield,
Miss Delia W. Marble,
Theophilus M. Marc,
A. Marcus,
Jacob Mark,
John Markle,
Dr. J. W. Markoe,
Henry S. Marlor,
C. P. Marsh,
Chas. H. Marshall,
Edwin S. Marston,
Mrs. E. Howard Martin,
W. R. H. Martin,
Francis Taylor Maxwell,
Robert Maxwell,
David Mayer,
Harry Mayer,
Effingham Maynard,
Mrs. Emma Mehler,
Jas. S. Merriam,
Herman A. Metz,
Dr. Alfred Meyer,
Edwin O. Meyer,
Harry J. Meyer,
J. Meyer,
Thos. C. Meyer,
John Miles,
Geo. M. Miller,

Jacob F. Miller,
Roswell Miller,
S. M. Milliken,
Peter Moller,
Alphonse Montant,
G. L. Montgomery,
Chas. Arthur Moore, Jr.,
Wm. H. Helme Moore,
Mrs. Daniel Moran,
Miss Annie T. Morgan,
Miss C. L. Morgan,
Edward Morgan,
E. D. Morgan,
Geo. H. Morgan,
A. H. Morris,
A. Newbold Morris,
Mrs. A. Newbold Morris,
Mrs. Cora Morris,
Mrs. Dave Hennen Morris,
Miss Eva V. C. Morris,
Henry Lewis Morris,
John Morris,
Louis R. Morris,
Fred. V. Morrison,
Geo. Austin Morrison,
C. W. Morse,
Richard Mortimer,
Henry C. Mott,
Carl Muller,
Mrs. H. W. Munroe,
Miss Catherine Murray,
J. G. Myers,
Nathaniel Myers,
Edward M. Neill,
Wm. Nelson,
A. G. Nesbitt,
Miss Catherine A. Newbold,
Miss Edith Newbold,
Frederic R. Newbold,
H. Victor Newcomb,
Zenas E. Newell,
Geo. L. Nichols,
Wm. Nilsson,
John Notman,
Francis J. Oakes,
Anthony Oechs,
E. E. Olcott,
Robert Olyphant,
Mrs. Emerson Opdycke,
Wm. S. Opdyke,
Mrs. Wm. Openhym,
William C. Orr,
Prof. Henry F. Osborn,
Augustus G. Paine,
N. F. Palmer,
S. S. Palmer,
Henry Parish, Jr.,
James C. Parrish,
Henry V. A. Parsell,
Charles Parsons,
John E. Parsons,
R. W. Paterson,
W. A. Paton,
O. H. Payne,
T. W. Pearsall,
Mrs. Frederick Pearson,
Mrs. Alfred Pell,
Miss Frances Pell,
Stephen H. P. Pell,
Geo. H. Penniman,
Chas. J. Perry,
Chas. G. Peters,
Samuel T. Peters,
W. R. Peters,
Chas. Pfizer, Jr.,
Guy Phillips,
Lloyd Phoenix,
Phillips Phoenix,
Carl Pickhardt,
Gottfried Piel,

Henry Clay Pierce,
Winslow S. Pierce,
Gifford Pinchot,
James W. Pinchot,
Mrs. James W. Pinchot,
Fred. S. Pinkus,
John O. H. Pitney,
Albert Plant,
Hon. Thos. C. Platt,
Gilbert M. Plympton,
H. F. Poggenburg,
Chas. Lane Poor,
Henry W. Poor,
A. S. Post,
H. A. V. Post,
C. A. Postley,
Miss Blanche Potter,
Frederick Potter,
Miss Martha Potter,
De Veaux Powel,
Geo. W. Powers,
Chas. Pryer,
J. Harsen Purdy,
Percy R. Pyne,
Dr. Edward Quintard,
Charles Raht,
Gustav Ramsperger,
Geo. Curtis Rand,
Edmund D. Randolph,
S. Rawitser,
G. B. Raymond,
Geo. R. Read,
Wm. A. Read,
G. H. Redmond,
Henry S. Redmond,
Whitelaw Reid,
Geo. N. Reinhardt,
E. B. Reynolds,
John B. Reynolds,
Miss Serena Rhinelander,
John Harsen Rhoades,
Prof. P. de P. Ricketts,
John L. Riker,
Samuel Riker,
Wm. J. Riker,
R. Hudson Riley,
H. Dillon Ripley,
Dr. Wm. C. Rives,
Miss Mary M. Roberts,
Julius Robertson,
Andrew J. Robinson,
Gen. Chas. F. Roe,
Edward L. Rogers,
Noah C. Rogers,
W. Emlen Roosevelt,
Mrs. W. Emlen Roosevelt,
Hon. Elihu Root,
Albert G. Ropes,
E. V. W. Rossiter,
Jacob Rothschild,
Ludwig Rothschild,
Wm. Rothschild,
Geo. P. Rowell,
Carman R. Runyon,
Jacob Ruppert,
Edward Russ,
Mrs. A. D. Russell,
Arthur Ryle,
Augustus St. Gaudens,
Clarence Sackett,
Mrs. Edward C. Sampson,
Daniel C. Sands,
Miss Marie L. Sanial,
Carl Schefer,
Miss Mary E. Schell,
J. Egmont Schermerhorn,
Mrs. H. M. Schieffelin,
Dr. Wm. J. Schieffelin,
Gustave Schirmer,
Rudolph E. Schirmer,

Henry W. Schloss,
Miss Jane E. Schmelzel,
Adam A. Schopp,
C. Schumacher,
Philip Schuyler,
C. M. Schwab,
Geo. S. Scott,
Robert Scoville,
John H. Screven,
Edward M. Scudder,
Geo. J. Seabury,
Francis K. Seagrist,
Charles E. Seitz,
Prof. Edwin R. A. Seligman,
George W. Seligman,
Jefferson Seligman,
Alfred Seton, Jr.,
W. H. Sheehy,
Edward M. Shepard,
Gardiner Sherman,
Wm. Schilhaber,
D. E. Sickles,
John W. Simpson,
W. T. Simpson,
John Sinclair,
Francis Louis Slade,
Albert K. Smiley,
Daniel Smiley,
Chas. F. Smillie,
Mrs. Annie Morrill Smith,
F. M. Smith,
Mrs. George W. Smith,
James H. Smith,
James R. Smith,
Sydney A. Smith,
Wm. Alex. Smith,
Samuel B. Snook,
E. G. Snow,
E. G. Soltmann,
Chas. Sooysmith,
Mrs Charlotte Sorchan,
Frederick Southack,
Samuel Spencer,
I. M. Spiegelberg,
Paul N. Spofford,
Mrs. Anna Riker Spring,
Dr. Edward Hamilton Squibb,
John Stanton,
J. R. Stanton,
Jno. N. Stearns,
James H. Stebbins,
James R. Steers,
Chas. H. Steinway,
Wm. R. Steinway,
Olin J. Stephens,
Benjamin Stern,
Isaac Stern,
Louis Stern,
Winfield S. Stern,
Alexander H. Stevens,
Frederic W. Stevens,
Dr. Geo. T. Stevens,
Lispenard Stewart,
Wm. R. Stewart,
Miss Clara F. Stillman,
Dr. D. M. Stimson,
James Stokes,
Mason A. Stone,
Sumner R. Stone,
William Stratford,
H. P. Strause,
Chas. Strauss,
Frederick Strauss,
F. K. Sturgis,
Mrs. F. K. Sturgis,
Edmund Sturzenegger,
Rutherfurd Stuyvesant,
Mrs. Geo. Such,
Mrs. James Sullivan,
Lionel Sutro,

Mrs. P. C. Swords,
Miss Mary Taber,
Edward N. Tailer,
James Talcott,
C. A. Tatum,
Thos. Tavenor,
Miss Alexandrina Taylor,
George Taylor,
Henry R. Taylor,
Stevenson Taylor,
C. H. Tenney,
H. L. Terrell,
Jno. T. Terry,
Nikola Tesla,
Thomas Thacher,
Ernst Thalmann,
Dr. Allen M. Thomas,
Geo. C. Thomas,
Seth E. Thomas,
David W. Thompson,
John C. Thompson,
L. S. Thompson,
Mrs. Samuel C. Thompson,
Walter Thompson,
Dr. W. Gilman Thompson,
Samuel Thorne, Jr.,
W. V. S. Thorne,
H. L. Thornell,
C. C. Tiffany,
Louis C. Tiffany,
Frank Tilford,
James Timpson,
J. Kennedy Tod,
William Tousey,
Mrs. Jane A. Townsend,
C. D. Tows,
J. Evarts Tracy,
Miss Mary S. Trimble,
Frederick K. Trowbridge,
Dr. Alfred Tuckerman,
Paul Tuckerman,
Geo. E. Turnure,
Benjamin Tuska,
Edward P. Tysen,
Edward Uhl,
E. S. Ullman,
Mrs. Lawsen Valentine,
Augustus Van Cortlandt,
Alfred G. Vanderbilt,
D. B. Van Emburgh,
E. H. Van Ingen,
W. Van Norden,
Edgar B. Van Winkle,
Robert A. Van Wyck,
Richard C. Veit,
Herman Vogel,
John Wagner,
Lewis Wallace,
Leopold Wallach,
Wm. I. Walter,
Artemas Ward,
Wm. T. Wardwell,
John Hobart Warren,
Allan C. Washington,
E. H. Weatheibee,
Mrs. John A. Weekes,
Chas. Wehrhane,
Camille Weidenfeld,
Charles W. Wells,
Mrs. John Wells,
R. E. Westcott,
Geo. Westinghouse,
Dr. John McE. Wetmore,
Dr. Geo. G. Wheelock,
Dr. Wm. E. Wheelock,
Miss Caroline White,
Horace White,
John J. White, Jr.,
Stanford White,
James Whiteley,

Miss Gertrude Whiting,
Giles Whiting,
Clarence Whitman,
Wm. Wicke,
Edward A. Wickes,
D. O. Wickham,
M. T. Wilbur,
David Willcox,
Robt. R. Willets,
Mrs. I. T. Williams,
Richard H. Williams,
Mrs. Douw D. Williamson,
W. P. Willis,
Charles T. Wills,
Geo. T. Wilson,
Henry R. Wilson,
R. T. Wilson,
Egerton Winthrop,
Grenville L. Winthrop,
Mrs. Frank S. Witherbee,
Ernst G. W. Woerz,
Mrs. Anzonetta B. Wolfe,
Emil Wolff,
Lewis S. Wolff,
Mrs. Cynthia A. Wood,
Henry R. Wood,
James Wood,
Jas. T. Woodward,
Prof. R. S. Woodward,
W. H. Woolverton,
Isidor Wormser,
P. B. Worrall,
Miss Julia Wray,
Mrs. J. Hood Wright,
A. Wurzburger,
Jno. J. Wysong,
Arthur G. Yates,
Edw. L. Young,
Andrew C. Zabriskie,
August Zinsser,
Charles Zoller,
O. F. Zollikoffer.

REPORT OF THE TREASURER

New York, January 8, 1906.

To the Board of Managers of the New York Botanical Garden.

Gentlemen: Herewith I submit a statement of my receipts and disbursements during the year 1905, and a balance sheet from my ledger as of December 30, 1905.

Respectfully yours,

C. F. Cox,

Treasurer.

Receipts

Balance as per last Annual Report........		$ 12,188.06
Contributions of the City Towards Development and Maintenance		102,944.54
Income from Investments:		
5 per cent. on $50,000 Southern Railway Co. First Consolidated Mtge. Bonds..........................	$ 2,500.00	
4½ per cent. on $50,000 Ches. & Ohio R.R. Co. Genl. Mtge. Bonds	2,250.00	
4 per cent. on $50,000 Erie R. R. Co. Prior Lien Bonds..............	2,000.00	
4 per cent. on $59,000 Erie R. R. Co. Penn. Collat. Trust Bonds...	2,360.00	
4 per cent. on $50,000 Reading R. R. Co. Jersey Central Collat. Trust Bonds.........................	2,000.00	
4 per cent. on $24,000 Northern Pacific R. R. Co. St. Paul & Duluth Division Bonds......	960.00	
4 per cent. on $30,000 Northern Pacific-Gt. Northern, C. B. & Q. Collat. Trust Bonds.................	1,200.00	13,270.00
Annual Dues		9,590.00
Interest at 3 per cent. on balances on deposit with J. P. Morgan & Co....		267.18
Proceeds sales of Merchandise.............		72.15
Proceeds sales of Publications............		148.52

Life Membership Fees			1,200.00
Fellowship Fees			3,000.00
Fellowship Members, Fees			300.00
Sustaining Members, Fees			475.00
Tuition Fees credited to Students' Research Fund			183.00
Subscriptions to "North American Flora" credited to Income of David Lydig Fund			99.30
Contributions to Special Book Fund			2,700.00
Contributions to Exploration Fund			2,885.00
Contributions to Endowment Fund			135.00
			149,457.75

Disbursements

Expenses paid through Director-in-Chief account City Appropriation	$102,944.54		
on Genl. account for Vouchers paid	21,192.62	124,137.16	
Lectures and Literature on Preservation of Native Flora, account Income of Stokes Fund		19.53	
Books, account Special Book Fund		2,227.48	
Specimens, etc., — account Exploration Fund		3,189.81	
Publications,— account Income of David Lydig Fund		1,484.88	
Director-in-Chief, addition to Working Fund		5,000.00	
Income of Students' Research Fund — Grant		50.00	$136,108.86
Balance, Cash in hands of Treasurer			$ 13,348.89

LEDGER BALANCES, DECEMBER 30, 1905

Credit

Permanent Funds:

Endowment Fund	$270,910.00
Fellowship Fees	11,000.00
Life Membership Fees	18,000.00

Students' Research Fund..............		2,559.50
David Lydig Fund — Bequest of Chas. P. Daly...............		34.149.86
Stokes Fund....................		3,000.00
Temporary Funds:		
Special Book Fund, for Library.....		708.81
Conservatory Fund, for Plants		28.38
Exploration Fund		230.57
Museum and Herbarium Fund, for Specimens............................		11.81
Income Students' Research Fund ...		324.98
Income Stokes Fund...................		149.35
Income David Lydig Fund...........		71.92
Fellowship Members' Fees...........		300.00
Sustaining Members' Fees		475.00
	Debit	
Investments:		
Net Cost of $50,000 Ches. & Ohio Ry. Co. Genl. Mtge. Bonds		
$50,000 Southern Ry. Co. 1st Consol. Mtge. Bonds.........		
$50,000 Erie R. R. Co. Prior Lien Bonds		
$59,000 Erie R. R. Penn. Coll. Trust Bonds	$302,611.68	
$50,000 Reading R. R. Co. Jersey Cent. Coll. Trust Bonds...........................		
$24,000 N. Pacific R. R. Co. St. Paul & Duluth Div. Bonds...........................		
$30,000 N. Pacific-Gt. Northern C. B. & Q. Coll. Tr. Bonds		
Director-in-Chief, Working Fund...	25,000.00	
General Income Account, Balance borrowed from Permanent Funds.	959.61	
Cash in hands of Treasurer.....	13,348.89	
	$341,920.18	$341,920.18

No. 66 Broadway,
New York City, January 31st, 1906.

Dr. N. L. Britton,
Director-in-Chief,
New York Botanical Garden,
Bronx Park, New York.

My dear Dr. Britton: In response to your letter of the 17th instant, I beg to notify you that I have caused the accounts of the Treasurer of the New York Botanical Garden to be examined and audited for the year 1905 and I take pleasure in reporting that the same have been found to be correct, in accordance with the balance sheet and statement of receipts and disbursements, enclosed herewith, with the Auditor's certificate attached.

Yours very truly,
James A. Scrymser,
Chairman Finance Committee,
New York Botanical Garden.

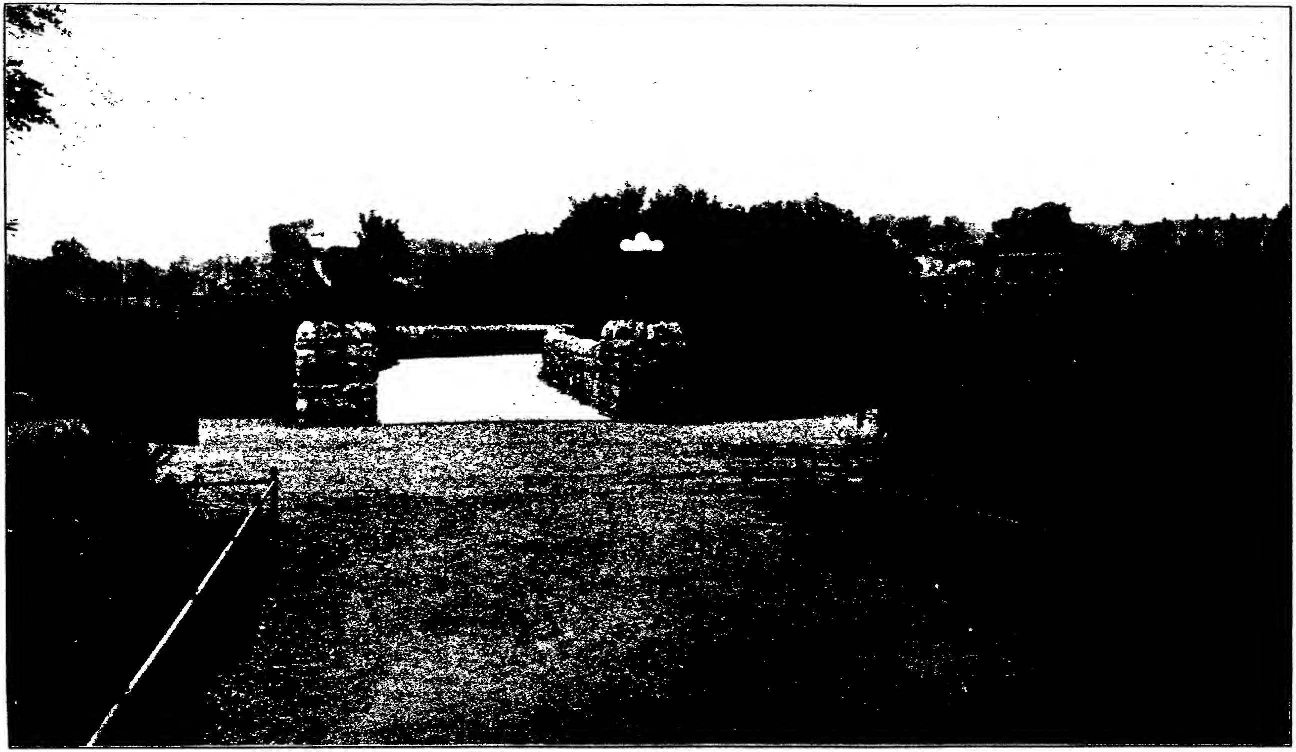
No. 66 Broadway,
New York City, January 31st, 1906.

James A. Scrymser, Esquire,
Chairman of the Finance Committee,
New York Botanical Garden,
New York City, New York.

Sir: This is to certify that I have, by your direction, examined the books and accounts of the Treasurer of the New York Botanical Garden, for the year nineteen hundred and five (1905) together with their proper vouchers, and that I find the balance sheet and the treasurer's statement of receipts and disbursements, attached hereto, to be correct.

I have, also, examined the various investments and find the same to be as reported in the said balance sheet.

Respectfully submitted,
J. L. Merrill,
Special Auditor.



APPROACH TO ELEVATED RAILWAY STATION

BULLETIN

OF

The New York Botanical Garden

Vol. 5. No. 16.

DESCRIPTIVE GUIDE TO THE GROUNDS, BUILDINGS AND COLLECTIONS

Location

The New York Botanical Garden is situated in the northern end of Bronx Park, the reservation including about 250 acres of land of a very diversified character, furnishing natural landscapes of great beauty and variety.

Means of Access

The Garden is conveniently reached in the following ways:

1. By the Harlem Division of the New York Central and Hudson River Railroad to Bronx Park Station.

2. By the Third Avenue Elevated Railway system to the terminal station of that road at Bronx Park.

3. By the Subway, Lenox Avenue and West Farms branch with transfer at 149th Street and Third Avenue to Elevated Railway, thence to Bronx Park Station.

4. By trolley car on Webster Avenue to 200th Street or the Woodlawn Road. This line connects with lines from the western part of the Bronx on Kingsbridge Road, and on Tremont Avenue, and also with the line to Yonkers.

5. By trolley line on the White Plains road east of Bronx Park from West Farms, Williamsbridge, and Mt. Vernon, connecting with lines from the eastern part of the Bronx at West Farms and at Mt. Vernon.

6. By driveways in Mosholu Parkway from Van Cortlandt Park; from Pelham Bay Park through Pelham Parkway; through the Crotona Parkway and Southern Boulevard

from Crotona Park; there are also driveway entrances at 200th Street, convenient for carriages coming from Jerome Avenue; at Newell Avenue, at the northern end of the Garden, for carriages coming from the north; at Bleecker Street on the eastern side of the Garden for carriages coming from the east; and at the Woodlawn Road, convenient for carriages coming from Yonkers, and from other points west and northwest of the Garden.

Purposes

The New York Botanical Garden was established by an Act of the Legislature of the state of New York passed in 1891 and amended in 1894 "for the purpose of establishing and maintaining a Botanical Garden and Museum and Arboretum therein, for the collection and culture of plants, flowers, shrubs and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects, for affording instruction in the same, for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people."

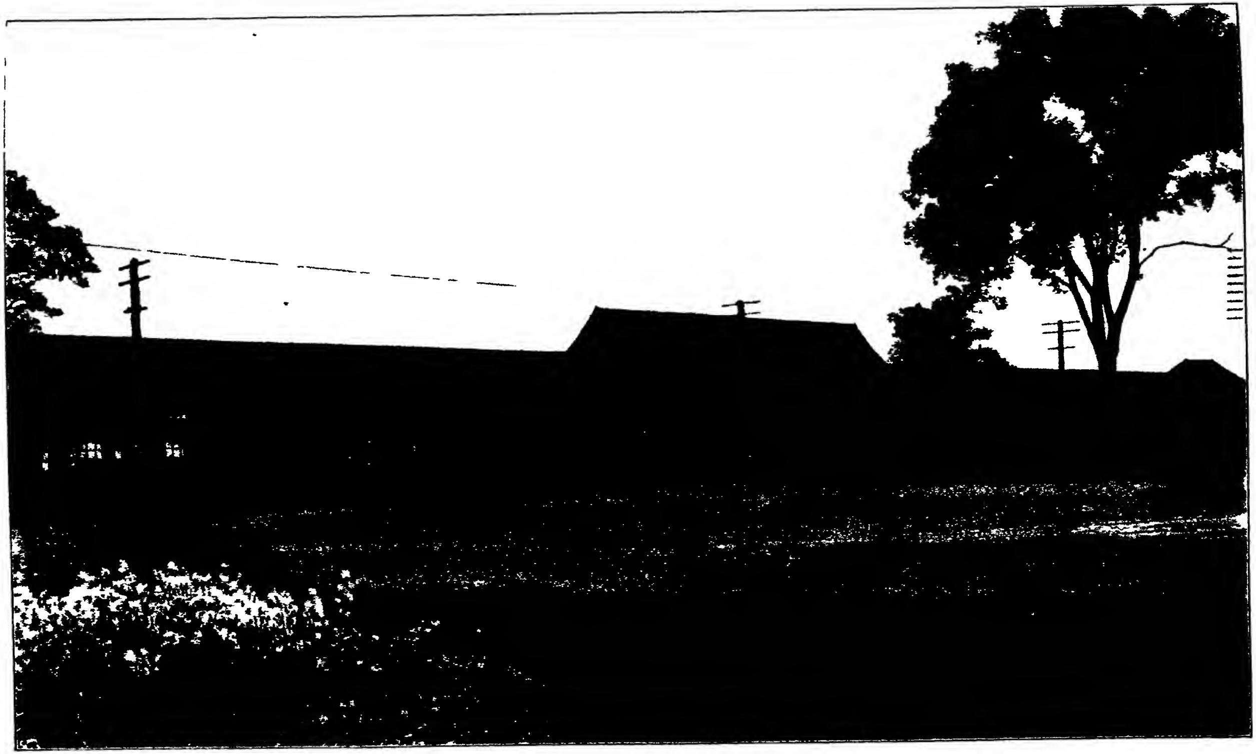
General Plan

The general plan of development includes:

1. The largest conservatories in America, for the cultivation of plants of tropical regions, located near the entrance at the elevated railway station. A second very large greenhouse is planned for construction near the Bleecker Street entrance on the eastern side of the Garden.

2. The largest botanical museum in the world, located near the Bronx Park station of the New York Central Railroad and the Mosholu Parkway entrance. This building includes a large lecture hall for public lectures in the basement; and the library, laboratories for instruction and research, and the herbarium, on the upper floor.

3. The pinetum, or collection of cone-bearing trees, mostly evergreens, which is being brought together on the hills and slopes on all sides of the great greenhouse, and in the space between that house and the museum building.



NEW YORK CENTRAL RAILROAD STATION

4. The herbaceous grounds, situated in a valley east of the great greenhouse near the Southern Boulevard entrance, containing collections of hardy herbaceous plants, arranged by botanical relationship, and also a collection of similar plants, arranged to demonstrate elementary botany; the economic garden, a plantation designed to illustrate hardy plants whose products are directly useful to man, is being installed in the northern part of the same valley.

5. The fruticetum, or collection of hardy shrubs, located on the plain northeast of the museum building at the Woodlawn Road entrance and extending northward into the north meadows; this collection is also arranged by botanical relationship.

6. The deciduous arboretum, or collection of trees which lose their leaves in the autumn, located along the entire eastern side of the grounds from south to north.

In addition to these artificial features, the following natural features are of special interest:

7. The hemlock grove, a forest of the Canadian hemlock spruce, clothing the hills between the museum building and the Bronx River and covering about forty acres, considerable portions of it being primeval.

8. The gorge of the Bronx River, extending south from the waterfall at the Lorillard Mansion, along the edge of the hemlock grove to the southern boundary of the Garden.

9. The north meadows and river woods along the Bronx River from the northern end of the hemlock grove to the northern end of the Garden.

1. The Conservatories

This great glass-house is 512 feet in length, with a central dome about 90 feet in height, and wings extending from the main range in such a way as to form a court open to the southwest. The area under glass is about one acre. The building stands on a terrace 5 feet in height, approached by six flights of cut granite steps connecting with the path and driveway approaches. The house contains fifteen com-

partments, separated by glass partitions and doors, as shown on the accompanying plan.

House No. 1 contains palms of numerous species from all parts of tropical and warm regions, both of the Old World and the New. Of those native in the southern United States there are noteworthy specimens of the palmetto (*Sabal Palmetto*), and of two Florida thatch-palms (*Thrinax*). The characteristic fan-palm of the California desert, *Neowashingtonia robusta*, is illustrated by two fine plants. Of West Indian palms, the collection contains the royal palm of Cuba and Florida, an elegant plant of the corozo palm (*Acrocomia media*) of Porto Rico and the Windward Islands; the cocoanut palm is now planted in all tropical countries for its fruit and for the numerous uses to which its fiber, wood, and leaves are applied; it is not definitely known that the cocoanut palm is a native of the West Indies, and where in the tropical regions it actually originated is uncertain. Central and South American palms are illustrated by the delicate *Cocos Weddelliana* from Brazil, by the silvertop palm (*Coccothrinax argentea*), and by the curious Mexican *Acanthorhiza aculeata*, with spine-like roots on its trunk. Old World species are shown in a very large tree of the Chinese fan-palm, by the date palm (*Phoenix dactylifera*) of northern Africa, by the very broad-leaved *Phoenicophorium sechellarum*, native of the Seychelles Islands, and by numerous other large species from the Pacific islands. Related to the palms and shown by numerous specimens in this house No. 1, we find a number of species of the cyclanthus family, the most conspicuous being the Panama hat plant (*Carludovica palmata*), from the young leaves of which the costly Panama hats are made. The sago palms, or cycads, are illustrated here by large specimens of *Cycas revoluta* from Japan, by *Cycas circinalis* from the Molucca Islands, by *Cycas media* from Australia, by the small coonties from Florida, and by the Kafir bread (*Encephalartos*), two species from Africa; the stems and trunks of plants of this family contain much starch, which is extracted, in the countries where they grow, by crushing and

washing, and passes into commerce under the name of sago starch. Opposite the entrance to the court in this house, is a group of bamboos, which belong to the grass family, the most noteworthy of them being the Chinese bamboo (*Bambusa vulgaris*), whose stems reach into the upper part of the dome; this plant grows with great rapidity each year by new shoots which come up from under ground, our measurements showing that they reached 65 feet in height in 95 days, a rate of about 8 inches a day. The plant has been introduced into the West Indies, and in Asia its stems are put to a great variety of uses in construction, for water pipes and for various utensils.

House No. 2 contains specimens of the aroids, on the middle bench, represented by a large number of different species. The plants of this family (*Araceae*) are mostly of tropical distribution, but they are represented in our northern flora by the skunk cabbage, the jack-in-the-pulpit and the sweet flag; the most familiar one in cultivation is the calla lily (*Richardia aethiopica*), not botanically a lily. The plants all have spikes of very small flowers closely massed together, and usually subtended by a broad leaf-like structure which is known as the spathe; this is usually highly colored, pure white, yellow, red or scarlet, and is commonly thought of as the flower, though not botanically so; species of *Anthurium*, known as tail-flowers, are abundant in the West Indies and tropical America, as is the genus *Philodendron*, signifying tree-loving, on account of many species being vines climbing high on the trees in tropical forests; numerous species have underground stems and branches which contain much starch and are cultivated in the tropics for food, under the name of yautias and taras. Plants of the same family, too large for exhibition in this house No. 2, will be found at the western side of house No. 4. The side benches of this house are occupied by plants of the pineapple family. These are mostly plants which live on the trunks and branches of trees in tropical forests, and are therefore called epiphytes, signifying plants growing up on other plants; many of them

are exceedingly beautiful in foliage and in flower; the so-called Florida moss, or Spanish moss, clothes the trees of the live-oaks in the southern Atlantic States, and is not a moss at all, but a plant bearing small flowers which show its relationship to others of this family. The pineapple itself, doubtless the most familiar member of this group, has been cultivated in tropical regions for an indefinite period for fruit, and is not certainly known in the wild state; the pineapple fruit is the ripened bunch of flowers which forms at the top of the stem; the plant is propagated by cutting off the tuft of leaves, which is found on the top of the fruit, and by suckers which sprout from the side of the plant near the ground; it is an exception to the tree-loving habit of most of the family, in growing on the ground, and is cultivated in the Bahamas and on the Florida Keys often in very rocky soil. One of the very spiny-leaved species, *Bromelia Pinguin*, is widely utilized as a hedge plant in the West Indies. Hanging from the rafters on both sides of this house will be found baskets containing the East Indian pitcher-plants, *Nepenthes*; these are mostly vines, growing naturally on trees, their leaves curiously modified at the ends into hollow structures provided with lids and technically known as pitchers, which are often wrongly regarded as the flowers; these pitchers contain water and secrete from their sides a glutinous liquid which digests insects that fall or crawl into the pitchers; this form of nutriment is apparently not necessary at all, however, to the growth of the plants; the flowers are small but borne in large clusters arising from the stems and may often be seen in this collection.

House No. 3 contains specimens illustrating several families of monocotyledonous plants of tropical regions. The amaryllis family is represented by a number of species of the spider lily (*Hymenocallis*), bearing large white flowers, the commonest being *Hymenocallis caribaea* from the sandy coasts of southern Florida and the West Indies; large plants of the genus *Crinum*, some of which have white flowers and some red or purple, may be seen on the middle bench, and

the maguey of the West Indies (a spiny-leaved relative of the century plant, native of the West Indies, and used there for hedges), on the southern bench; this name maguey is also applied in parts of the West Indies to species of *Agave*, which will be found in house No. 6.

Numerous representatives of the lily family, especially of the genus *Dracaena*, will be found on the south bench, and these are much used for ornamental planting in the tropics; here also are plants of the genus *Sansevieria*, the bow-string hemps of Africa; a valuable tough fiber is derived from their leaves; larger plants of the lily family will be found in the adjoining house No. 4, a corner of this house being given over to tall dracaenas and their relatives.

The arrow-root family is illustrated by the arrow-root (*Maranta arundinacea*), native of South America, but widely cultivated in the West Indies, its roots furnishing the commercial product; *Calathea* comprises a large number of tropical American plants noteworthy for their fine foliage, and there are other genera represented.

Here also will be found several species of the genus *Costus* and of other genera of the ginger family, and some tropical species of the *Iris* family and of the banana family, but most of these are in the adjoining house, No. 4, growing too tall to be accommodated in house No. 3.

House No. 4. Here are brought together many kinds of large tropical plants belonging to families also represented in the smaller houses, but too tall to be grown on the benches. The collection of bananas and their relatives occupies the greater part of the space and one or more of the specimens is usually in fruit; the collection contains both the edible, commercial bananas and the plantains, and also several species whose fruit is not edible, but whose interest lies in their decorative leaves and flowers. The stems and leaves of all these plants contain some fiber, which is produced in enormous quantities in the Philippine Islands from *Musa textilis*, and is the well-known Manila hemp. The supply of fruit for the United States comes mostly from Central

America and the West Indies, and some from northern South America. Bananas will grow in southern Florida, but the rocky soil of that region is not well adapted to their cultivation. The traveler's tree, from Madagascar, is shown in several fine specimens, and gets its English name from the fact that the axis of each long leaf-stalk contains a great deal of water which can be tapped and drunk. The bird-of-paradise plants, which take their name from their gaudy flowers, will be found in this group; they are natives of southern Africa and belong to the genus *Strelitzia*. The fourth genus of the banana family, *Heliconia*, is also represented by several species, called wild plantains, natives of tropical America.

The interesting screw-pines, natives of the Old World tropics, are illustrated by several species, the leaves of which are used in the manufacture of mats, hats and baskets. These plants are not at all related to pine trees, the latter part of the name referring to the slight resemblance the leaves bear to those of pineapple plants, which are commonly called *pines* in the tropics, while the remainder of the name was suggested by the spiral arrangement of the leaves.

At the west end of this house will be found large specimens of the aroid family already referred to in describing house No. 2, the most noteworthy one of these being a magnificent plant of Veitch's tail-flower (*Anthurium Veitchii*), from Colombia, which is believed to be the most elegant plant of its kind in cultivation; climbing on trunks of trees set as supports, will be found a number of vines of the genera *Philodendron* and *Monstera*, the latter a native of Mexico, producing an edible fruit with the odor of pineapple.

A large tree of the common rubber plant, much grown in parlors, will be found in the center of this house, reaching to the roof; this is a native of tropical Asia and yields some rubber, but not in as great quantity nor of as good quality as the other rubber trees of South and Central America; it is a species of fig (*Ficus elastica*); other species of *Ficus* are shown in this house, notably a fine tree of Roxburgh's fig, which bears its fruit in bunches near the base of the tree, but

this fruit is not edible. Chocolate trees (*Theobroma Cacao*) native of tropical America, may be found near the western door of this house; the small white flowers are produced on the trunk and on branches, and a few of them develop into the large woody pods containing the seeds or chocolate beans, which are dried and ground up into chocolate and cocoa; specimens illustrating the chocolate industry will be found in the economic museum. The papaya, or papaw, also of tropical America, is illustrated by a tall tree in the middle of this house; its fruit, esteemed as an aid to digestion, is borne just under the crown of leaves.

Several interesting tall vines climb on the pillars of this house, among them the night-blooming jessamine (*Cestrum Parqui*) of tropical America, which opens its flowers after dark and exhales a delicious perfume, the flowers remaining open during part of the morning; Henderson's *Alamanda* of Brazil, with its showy large yellow flowers, climbs to the roof.

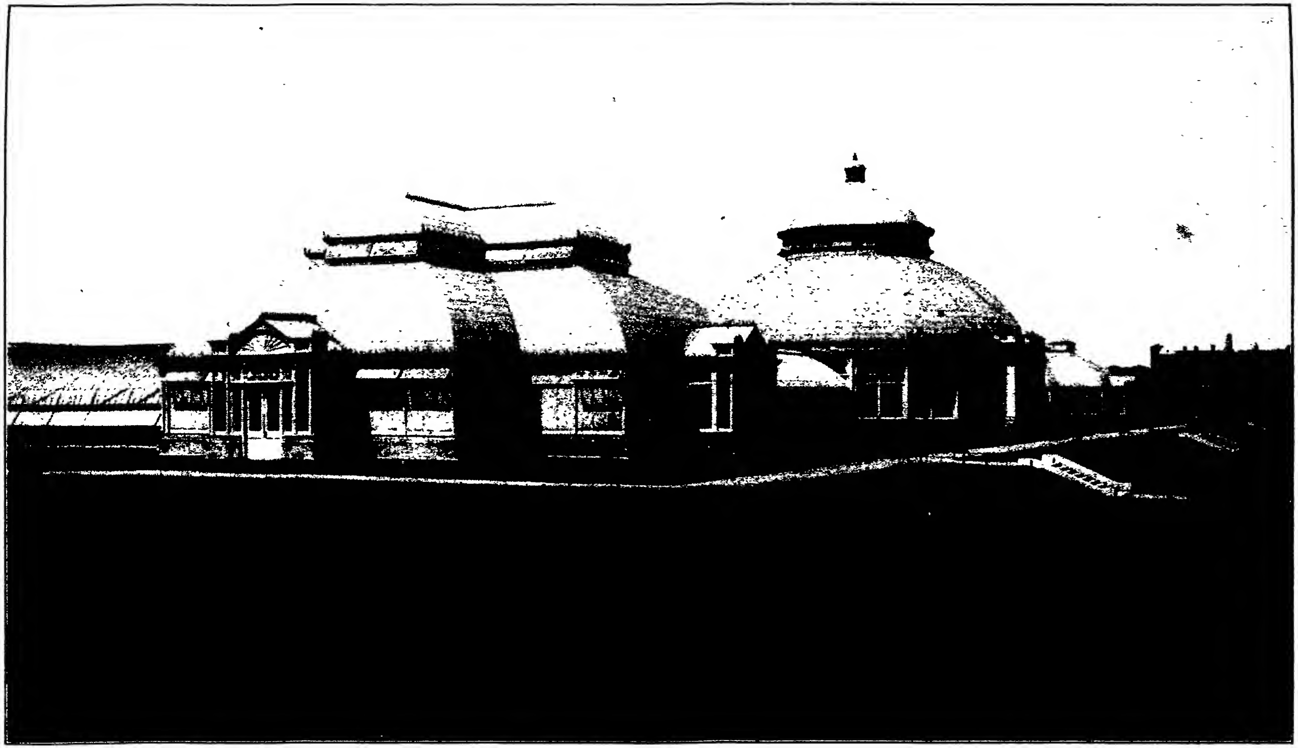
House No. 5. The plants in this house are from desert regions. Especial attention is called to their fleshy stems or leaves which serve as storage organs for a water supply to carry them over periods of drought. On the right hand bench, as one enters from No. 4, are found mainly plants from southern Africa: the carrion flowers (*Stapelia*), relatives of our common milkweed of the roadsides; *Aloe*, *Gasteria*, *Haworthia*, and other South African representatives of the lily family.

The central bench is entirely devoted to the cactus family, which, with few exceptions, is American. Nearly all these plants are devoid of leaves, these organs, when present, being small and inconspicuous; in the genus *Opuntia* they are usually present on the young growths as awl-shaped bodies, while in some few species they are much larger and remain for some time; in the genus *Pereskia*, specimens of which will be found in house No. 7, the leaves are large and well developed. The stems of the cacti are fleshy and assume a great number of forms; in *Opuntia* the stem is composed

of joints, either cylindric or broad and flattened. In *Cereus* some species have the stems angled, and sometimes bearing roots, while in others they are thick massive columns with many longitudinal ribs; in *Echinocactus* the plant-bodies are but little elongated, or almost globular, while in other genera the plant-body is covered with rows of spirally arranged projections. The flowers of many cacti are exquisite in form and color; they are borne on various parts of the plant-body, in the turk's-head cactus on a curiously modified portion of the apex. A plant of economic interest here is *Nopalea coccinellifera* upon which the cochineal insect breeds; it is from these insects that the dye cochineal is obtained.

On the remaining side bench is the stone-crop family represented by many interesting and beautiful forms. The echeverias from Mexico and Central America, and the sempervivums, or house-leeks, from the Old World, are conspicuous among these. Many of the stone-crops are hardy plants and a collection of these will be found at the herbaceous grounds. Only a few cactuses are hardy.

House No. 6. This is also a desert house. On the two corner benches to the right, as one enters from No. 5, is a collection of century plants (*Agave*), a large genus known only from the New World; other and larger plants of this same genus will be found in the central portion of the house. Conspicuous among these are: the thread-bearing agave, Queen Victoria's agave, the sisal plant (*Agave sisalana*); and the common century plant (*Agave americana*). The first two are decorative and curious; from *Agave sisalana* is manufactured the sisal hemp of commerce; the last, *Agave americana*, is well known, and it is from the sap of this, and of related species, that the Mexican drink "pulque" is obtained by fermentation. It is popularly believed that the century plants flower but once in a hundred years, and then die; it is true that the plant dies when done blooming, but it blooms at a much earlier age than a century, sometimes when but eight or ten years old, it is said. A curious desert plant among the century plants on the side bench is called by the natives of Mexico, its native



THE CONSERVATORIES

country, "huariqui" (*Ibervillea sonorae*); during the rainy season green stems arise from these large woody plant-bodies, which at other times remain in a resting condition.

A group of the lily family will be found in the central portion of this house. This comprises members of the genera *Aloe*, *Yucca* and *Dasylirion*. A group of cacti will also be found here, the most imposing figure of which is the giant cereus, *Cereus giganteus*, known as "suwarro" by the Mexicans and Indians of its native country, Arizona and Sonora. The plants here shown were obtained by an expedition sent to those regions by the Garden in 1902, and they represent perhaps the largest specimens in cultivation in the east. Several large specimens of the hedgehog cactus, secured at the same time, form part of this group. The Indians in the desert often secure a supply of drinking water from these plants by cutting off the top and macerating the interior substance. A number of other large and rare cacti secured by a Garden expedition of 1906 have recently been added to this collection. On the remaining corner benches will be found the fig marigolds, from southern Africa, desert members of the pineapple family, and representatives of the spurge family.

House No. 7. Many families are shown here, the representatives of which are tropical. The members of the mimosa and senna families, largely represented in this house, are curious in their sleep movements; as daylight wanes the leaves begin to droop and the leaflets to fold up. Belonging to the senna family may be mentioned: the logwood tree (*Haematoxylon campechianum*), widely distributed throughout tropical America; the copaiba tree (*Copaiva officinalis*), one of the trees from which copaiba is obtained; and the tamarind tree (*Tamarindus indica*), valuable for its fruit. In the mimosa family the humble or sensitive plant (*Mimosa pudica*), whose leaves fold at the least touch, is of peculiar interest. The mahogany tree (*Swietenia Mahagoni*), and the cocaine plant (*Erythroxylon Coca*), from South America, are important economic plants. In the custard-apple family are

the cherimoyer (*Anona Cherimolia*), and the sour sop (*Anona muricata*). The mammee-apple is another tropical fruit, belonging to the gamboge family. The spurge family is represented in several curious forms, many of them much resembling members of the cactus family; while others bear large leaves, as is the case in the chenille plant, or Philippine medusa (*Acalypha hispida*); belonging to this family also is the plant bearing physic or Barbados nuts (*Jatropha Curcas*). The showy genus *Codiaeum*, commonly known as crotons, also belongs to the spurge family. Members of the cactus family, represented by several genera, especially of kinds growing naturally on trees in tropical forests, will be found near the spurge family. Decorative members of the ginseng family are also in this house.

House No. 8. As in house No. 7, the plants assembled here are of miscellaneous interest. The madder family is present in showy forms of ixoras, hoffmannias and rondeletias. There are striking forms of the potato family; also attractive representatives of the gesnerias, in the African or Usambara violet, and several forms of the genus *Trichosporum*, excellent basket plants. On the north side bench will be found a collection of begonias in many forms, ranging from the large-leaved *Begonia nelumbifolia*, of the West Indies, to the small-leaved *B. foliosa*, from Colombia, and the dainty little *B. rotundifolia*, known only from the island of Haiti, and for many years lost to science. The showy foliage forms of *Begonia Rex* are present in great variety. Among the more noteworthy economic plants are the ramie plant (*Boehmeria nivea*), a native of China, from the fiber of which the so-called grass-cloth is woven; and the bread-fruit tree (*Artocarpus incisa*), originally from the islands of the Pacific and introduced into the West Indies in the latter part of the eighteenth century.

House No. 9. This is the aquatic house, and plants which find their homes in the water or require much moisture are brought together here. From the bridge spanning the pool the various features may be readily observed. Fringing the

pool on the right, as one enters from house No. 10, are members of the sedge and grass families, while on the left hand side the fringe is made up entirely of grasses, largely of the graceful bamboos. Of special interest among the sedges is the Egyptian paper-plant (*Cyperus Papyrus*), from which many of the ancients obtained their writing paper. Among the grasses by far the most important is the sugar cane (*Saccharum officinarum*); from the lower portions of its stalks the juice is extracted by pressure, and from this juice sugar is manufactured. Among the plants in the pool are many with attractive flowers; conspicuous among these being water-lilies (*Castalia*), of which there are several different kinds; the water hyacinth; the parrot's-feather, with its delicate feathery masses of green; the water poppy; the water snowflake; the water lettuce, a member of the aroid family; the floating fern; and some odd little plants related to the ferns, members of the genus *Salvinia*.

House No. 10. This house is devoted to ferns and their relatives from tropical countries. The species from temperate regions will be found in house No. 12. The collections are here arranged in botanical sequence, and thus closely related families and genera are brought into juxtaposition, enabling one to make a comparative study of these plants; on the north side bench will be found, among others, some of the climbing ferns (*Lygodium*), the cliff brakes, and a large group of the maidenhair ferns, embracing many forms, some of them of exceeding beauty; on the south side bench will be found the brakes (*Pteris*) and their relatives, and the large group of the genus *Selaginella*, relatives of the ferns. On the central bench are many of the polypodies, including a group of the golden polypody; many shield ferns; several species of the genus *Nephrolepis*, to which the Boston fern belongs; and a collection of davallias, some of which are very decorative. Some fern-relatives, represented by the genera *Salvinia* and *Marsilea*, will also be found on the south bench.

House No. 11. Here are placed the tree-ferns and such

other specimens of tropical ferns as are too large for the benches in house No. 10. Many specimens of tree-ferns, from various parts of the world, are here brought together. These graceful plants usually inhabit the mountains of the tropics, commonly at an elevation of 1500 feet or more. Many of the plants here have been secured by Garden expeditions to different parts of the American tropics. Another feature of interest is the group of staghorn-ferns, occupying one corner of the house; the application of the common name staghorn is quite evident in several of the species. Suspended from the roof in baskets are many desirable ferns. A fern from China and Tartary, known as the Scythian Lamb (*Cibotium Barometz*), will be found in the center of this house near the walk; it is of interest as forming the basis of a marvellous tale, current in early times, to the effect that on a vast plain to the eastward of the Volga occurred a wonderful plant, looking like a lamb; this animal, so the story ran, was supported upon a stalk and as soon as it had exhausted the vegetation at hand died from starvation.

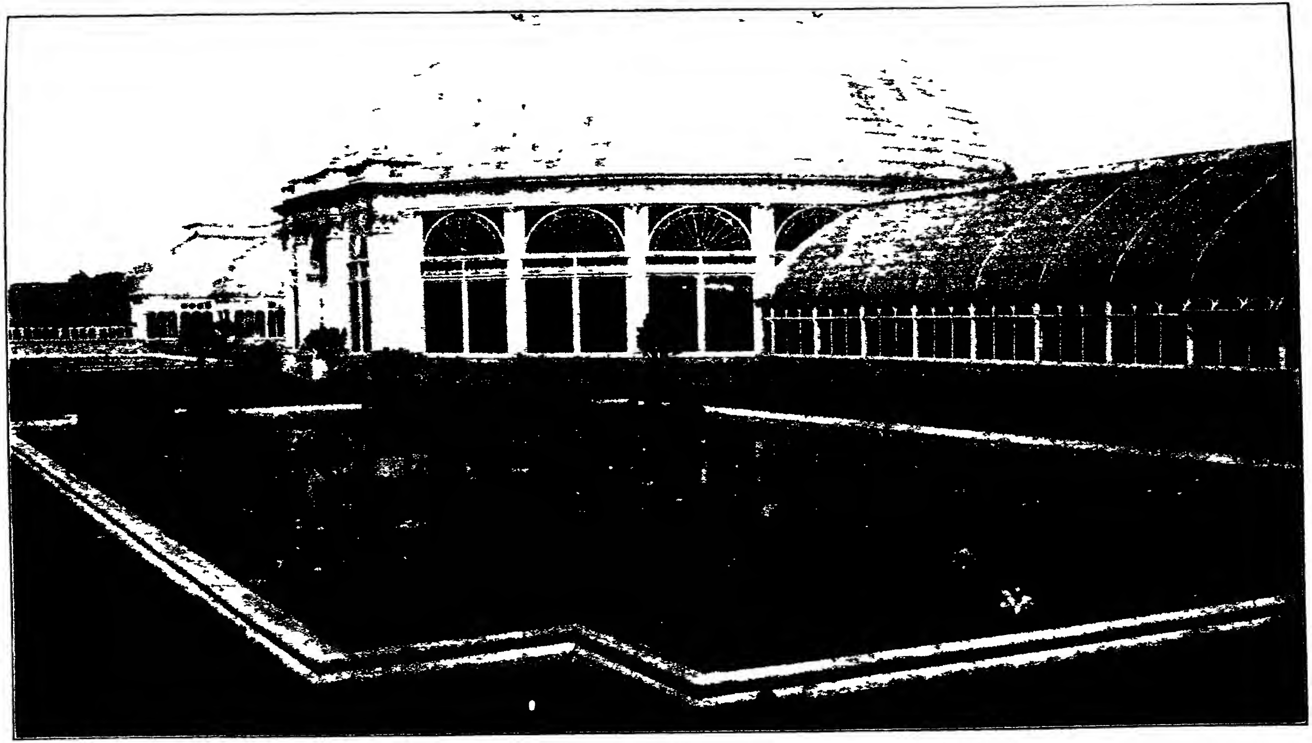
House No. 12. The plants in this house, as well as those in house No. 14, are arranged in botanical sequence, with a view to furnishing a collection for the comparative study of plant families and genera; to make this as complete as possible, as many representatives of families and genera are brought together as space and cultural conditions permit. Cultural requirements necessitate placing the ferns and their allies somewhat out of their sequence position, at the south end of the west side bench. The east side bench is devoted to the pine family, the yew family, and to the endogenous plants, the last named terminating with the orchids, next the tree-fern house. The sequence of exogenous plants begins on the west side bench, as one enters from house No. 13, crosses to the central bench at the ferns, and continues around that, ending in this house with the loasa family, near the fern house. The sequence is then continued in house No. 14, beginning with the mezereon family on the north side bench, at the entrance from house No. 13, continuing

around the central bench and ending with the thistle family on the end of the south side bench near the entrance to house No. 13. Nearly all the plants in houses 12, 13 and 14 are natives of warm temperate regions.

Among the more interesting species on the west side bench are many Australian plants, represented by grevilleas, hakeas, and others; a group of insectivorous plants will also be found here; among these are the pitcher plants (*Sarracenia*) in several species; the pitchers contain a liquid in which the insects are drowned, the fluid resulting from their decay being absorbed by the pitchers; these structures form a part of the leaves and are a modification of the petiole. The sundews (*Drosera*) secrete a sticky substance from the gland-hairs on their leaves, which can digest insects and other animal matter. On the central bench will be found a group of the rue family; to this belong, among others, the oranges and lemons, of which a number of small specimens are here, others being placed in house No. 13. A peculiar plant of this family is *Agathosma apiculata*, of southern Africa; its leaves are full of glands which secrete an oil exhaling a disagreeable odor quite apparent at times. On the east side bench are members of the lily family and the amaryllis family, with many other endogenous plants, including a collection of orchids which grow in warm temperate regions or in the mountainous sections of the tropics. In the yew family, perhaps the most interesting are two small plants of the "stinking cedar" (*Tumion taxifolium*) so-called by the natives where it grows; it is known to occur in a wild state in a small area along the Apalachicola River in Florida.

House No. 13. This house contains such plants as are too large for proper exhibition in houses 12 and 14. The endogenous plants will be found on the side next house No. 14; the remainder of the house is occupied by exogenous plants. Opposite the entrance from house No. 14 is a group illustrating the pine family and the yew family. The most conspicuous objects among the former are the arau-

carias, which take the place in the southern hemisphere of the pines in the north; *Araucaria brasiliana* and *A. Bidwillii* are prominent among these; the common Norfolk Island pine (*Araucaria excelsa*) is shown in several large specimens. To the right of this, across the path, will be found specimens of the New Zealand flax (*Phormium tenax*), and on one of the trellises in the rear is a vigorous plant of the Cherokee rose. To the left, a little beyond the pine family, is the myrtle family; prominent in this is a group of the gum-trees of Australia and Tasmania (*Eucalyptus*); these trees occur in large forests, and sometimes attain a height of 200 to 400 feet. A large specimen, some ten or twelve feet tall, of the bottle-brush tree (*Callistemon citrinus*) will be found here; the red flowers are borne in long cylindric clusters, much resembling a common bottle-brush, whence the popular name. Farther to the left is a large plant of *Hydrangea hortensis;* this presents a gorgeous show of blue flowers early in the summer. In the corner to the right is a specimen of the camphor tree (*Cinnamomum Camphora*), from which the camphor of commerce is derived. Opposite the camphor tree is a group containing the common garden camellia, and the important commercial plant *Thea sinensis* from which is obtained our beverage tea; black and green teas are obtained from the same plant, the difference in color being due to the method of preparation; the tea plant is extensively cultivated in many warm and tropical countries, tea as a beverage having been used by the Chinese from time immemorial; its first introduction into Europe is said to have been by the Dutch in 1610. Further along to the left, beyond the group of Australian acacias, of which there are many specimens, are several plants of the fig tree (*Ficus Carica*), from which the edible figs are secured; the leaves drop off in winter, and so for a short time the plants are placed elsewhere. A little beyond these to the left will be found a group of oleanders; a poisonous principle occurs in the flowers and leaves of these plants, and especially in the bark. A plant of great economic importance in the olive family is the olive



COURT OF THE CONSERVATORIES

tree (*Olea europaea*), of which a small specimen will be found near the oleanders; this plant was originally from the Mediterranean region and the Orient, but has now been largely introduced into cultivation in other warm countries; in the middle of the eighteenth century it was first introduced into California, at San Diego, it is said, and is now largely cultivated in southern California. On one of the columns near the olive is a fine plant of *Bougainvillaea*, a native of Brazil; the bracts which surround the small flowers are bright magenta colored; when in full bloom the plant makes a gorgeous show. On one of the trellises back of the group of the amaryllis family is a plant of the yellow jessamine (*Gelsemium sempervirens*) of the south; it sends out its pretty flowers usually in February, and they persist for several weeks.

House No. 14. The general arrangement of this house was mentioned when describing house No. 12. Entering from house No. 15, to the left will be found plants of the rosemary; this enjoys a reputation of long standing, for it was held in high esteem by the ancient Greeks and Romans, being regarded by them as the emblem of fidelity. A little further to the left is the parachute flower (*Ceropegia Sandersoni*), from Natal. On the right are many interesting members of the thistle family. On the other side of the house will be found *Aucuba japonica*, from Japan, and *Corokia Cotoneaster*, from New Zealand, both members of the dogwood family, but not much resembling our common flowering dogwood. Other plants of interest will also be found here.

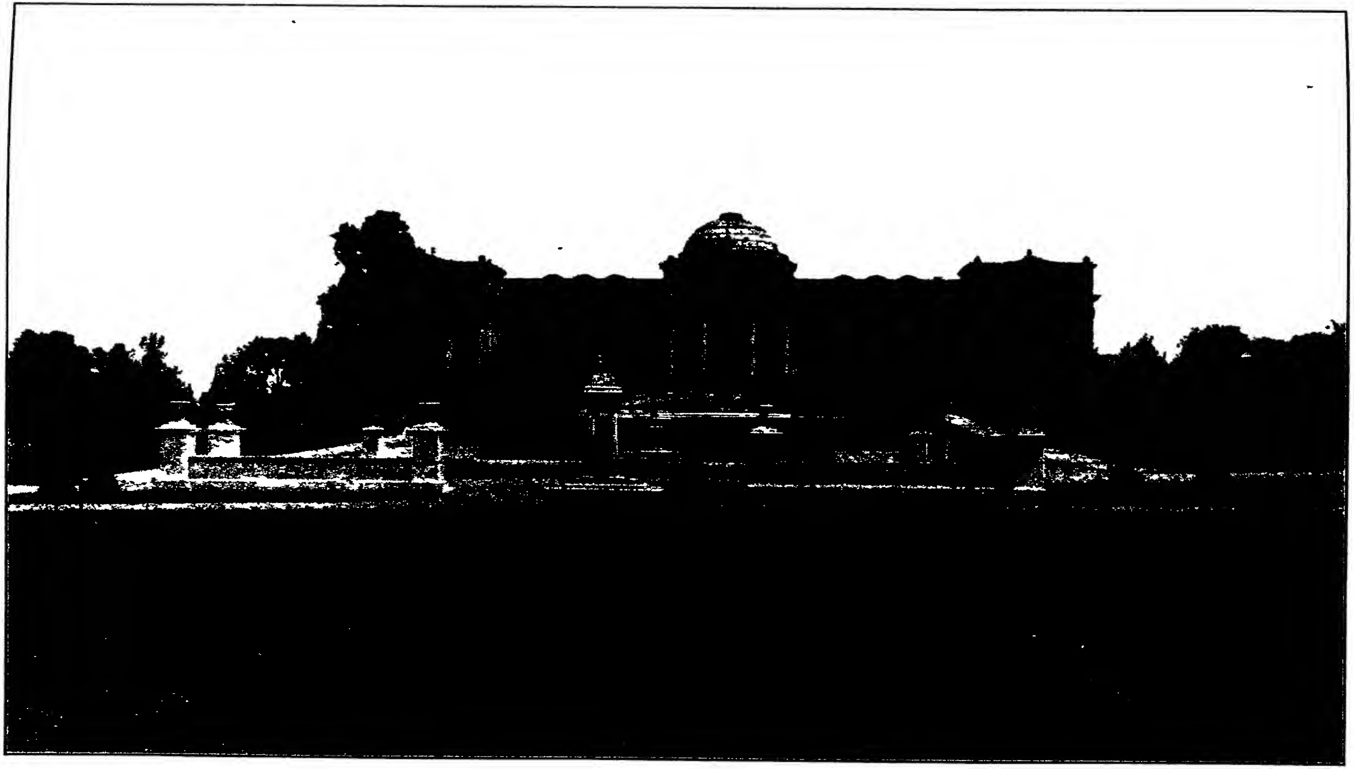
House No. 15. This house is mainly devoted to the orchids, the side benches and rafters being entirely given over to this family. On the central bench is located a collection of small palms and cycads.

The orchid family is a widely distributed one, occurring in all tropical regions, but finding its greatest development in the Old World in India and the Malayan region, while in the New World its greatest numbers occur in Brazil and other parts of northern South America. In temperate regions rela-

tively few species are found, while in very cold countries they are entirely absent. Most of the tropical forms are epiphytes, that is, they grow upon trees and usually have bulb-like or thickened stems and fleshy leaves for the conservation of their water supply, as, from their habitat, this supply must be precarious. In temperate regions nearly all of the species are terrestrial, and have thin leaves, the soil about their roots serving to protect them from the cold and also giving them a more constant water supply: they do not, therefore, need pseudobulbs or thickened stems. Coming from all parts of the world as they do, their blooming time varies greatly, so that at almost any time of the year, be it winter or summer, some of these interesting plants will be found in bloom.

Among the palms on the central bench the most interesting is the double cocoanut (*Lodoicea maldivica*), a native of the Seychelles Islands, also known as the coco de mer, and coco des Maldives, and one of the rarest palms in cultivation; in the specimen here shown the upper portion of the seed may be seen projecting above the soil. The tree in its native wilds attains a height of ninety feet, bearing aloft a magnificent crown of green leaves which make it an important feature of the landscape.

Tanks for water-plants. In the court formed by the conservatories are two tanks in which are grown a large collection of water-lilies. In the easterly tank are placed the hardy sorts, such as are able to withstand the severe cold of our winters, which remain permanently where they are, winter and summer. In the westerly pool are, in the main, the tender kinds, or such as require protection during the winter, and many of these are stored in a warm cellar during winter, and placed on view again in the spring. The most conspicuous of the tender sorts are the royal water-lilies (*Victoria regia* and *Victoria Cruziana*), from South America; these are not hardy in this climate, and, as they are too large to protect from the cold, they are grown anew from seed each year; the seeds are sown in the propagating houses late in winter, and the young plants placed on view late in the spring or in early summer.



E USEU BUILDING

Power House. Steam for heating the conservatories is supplied from the power house, located near the New York Central Railroad just south of the 200th street entrance and connected with the conservatories by a subway about six hundred feet long containing the steam mains; five boilers are installed at the power house and supply steam not only to the conservatories, but also to the museum building through another subway about twelve hundred feet in length.

2. The Botanical Museum

The Museum Building has a frontage of 312 feet, and in so far as now constructed, a depth of about 90 feet; the plan of this building contemplates its future extension toward the rear, so as to form a quadrangle enclosing a court. Three floors are devoted to public exhibits, while the upper floor contains study rooms, the library, laboratories and herbarium, which may be used and consulted by permission. The architectural style of the building is Italian Renaissance. The walls are of light-colored brick and the trimmings of terra-cotta. It has a steel frame and concrete floors.

The building is approached by two straight driveways and accompanying sidewalks leading from the main park driveway near the New York Central Railroad station; this front approach to the building is ornamented by a bronze fountain executed by the sculptor Carl E. Tefft, and by terra-cotta fountains and marble seats designed by R. W. Gibson, the architect of the building. The vista lines are formed by four parallel rows of trees.

The public collections in this building are:

1. THE MUSEUM OF ECONOMIC BOTANY

This occupies the entire main floor, and here are brought together both crude and refined products of plants used in the arts, sciences and industries, illustrated also by photographs and drawings. Especial care has been taken to admit nothing but authentic specimens, and these are arranged as products,

including foods, drugs, fibers, gums, resins, sugars, and others as indicated by the accompanying floor plan.

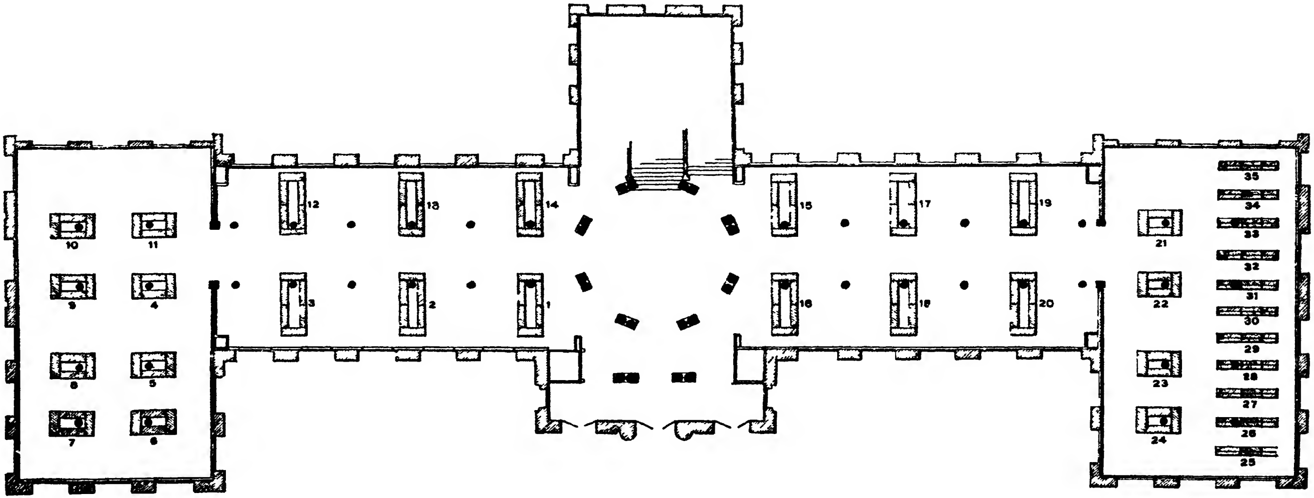
The arrangement of the larger groups is as follows: Foods and fibers occupy the west hall, the former in cases on the north side, the latter on the south. The west wing is mainly given over to exhibits other than foods, fibers, drugs and woods. The east hall contains the drugs, while the east wing is set aside for the woods and wood products, and for a collection illustrating North American dendrology.

Fibers. Cases 1 to 18.—In the first case of the series devoted to fibers will be found cotton, the most important of the vegetable fibers. It is derived from the fruit of the cotton plant (*Gossypium*), being the hairs that cover the surface of the seeds. There are several different kinds of the cotton plant from which fiber is derived. The fruits of some of these may be seen with the cotton bursting from the capsule, while some of the many different products are also shown.

The fiber of many other plants, derived from the leaves, stem, bark, roots, and other organs, is of great economic importance and is used, either in practically its natural condition as may be seen by the specimens of fans, hats, boxes, bags, baskets, mats, matting, crude ropes, brooms, ornaments and toys, or it is manufactured into articles of commerce after processes which remove it considerably from its natural aspect or condition; for example, linen, which is made from the flax plant; cloth, twine and rope, from jute, hemp and abutilon fiber; and paper made from wood and other fibers.

India Rubber and Allied Products. Cases 19 and 20.—The first case in the west wing contains india rubber and allied products. Here are the implements and utensils used in collecting the rubber "milk" from the trees which grow in the tropical forests. Rubber is derived mostly from trees belonging to the mulberry family, spurge family and dogbane family.

Several varieties of rubber may be seen in the different stages of refinement, together with some articles as manufactured for the market. Here too is an allied product,



FLOOR-PLAN. MUSEUM OF ECONOMIC BOTANY

1–3. Cases 1–18. Fibers.
4. Cases 19 and 20. India Rubber and Allied Products.
Cases 21 and 22. Resins.
5. Cases 23–26. Spices and Flavoring Agents.
6. Cases 27 and 28. Fodder Plants.
Case 29. Dye Stuffs.
Case 30. Tanning Materials.
7. Cases 31–33. Tobaccos and Masticatories.
Case 34. Miscellaneous Specimens.
8. Cases 35–38. Beverages.
9. Cases 39–42. Fixed and Volatile Oils.
10. Cases 43 and 44. Plant Constituents.
Cases 45 and 46. Sugars.
11. Case 47. Starches.
Cases 48–50. Cork and Paper.
12–14. Cases 51–68. Foods.
15–20. Cases 69–86 and 169–186. Drugs.
21–35. Cases 87–168. Woods and North American Dendrology.

gutta percha, which is derived from the trunks and foliage of certain trees belonging to the sapodilla family, these trees growing in many portions of the tropics. The specimens exhibited show this product in both the crude and refined condition.

Resins. Cases 21 and 22.—The cases devoted to resins contain on the one hand a large trunk of the long-leaf pine, with a turpentine box, together with a series of specimens of turpentine and resin, illustrative of the trade-classification of these products, and on the other hand a series of resins derived from other species of pine and related trees, and also those from trees representing the mulberry family, the mimosa family, the sumac family and the myrrh family.

Spices and Flavoring Agents. Cases 23 to 26.—These substances form quite a large series in which is shown the parts of the plant that yield spices and flavoring extracts; for example, licorice is extracted from the roots of the licorice plant. Ginger is a rootstock, the underground stem of the ginger plant; cinnamon is a bark; bay, sage, mint, thyme are leaves; cloves are flowers; coriander, allspice, black pepper, celery seed, caraway seed, vanilla bean and tonka bean are fruits; mustard and nutmeg are seeds, and mace is the outer coat of the nutmeg.

Fodder Plants. Cases 27 and 28.—Following the spices are fodder plants, which are shown as sheaves, and consist of grasses, sedges, bush-clovers and related plants.

Dye Stuffs. Case 29.—The dye stuffs are represented by logwood, madder, alkanet root, indigo and oak galls.

Tanning Materials. Case 30.—The tanning materials are also very important from an economic standpoint; they are represented by saw-palmetto, mangrove, pine, hemlock and sumac. The crude materials of the mangrove and the saw-palmetto are accompanied by the fluid extract which contains the tannic acid and also by the spent material or refuse which remains after the extract has been made.

Tobaccos and Masticatories. Cases 31 to 33.—Tobaccos are shown by a series of bundles of the cured leaves of the

tobacco plant (*Nicotiana*) from different parts of America, and a series of articles as prepared for the market. Closely associated with tobacco are the masticatories or substances used for chewing. One of the most widely known forms is chewing gum, which is made by refining the crude chicle-gum, which is the hardened milky juice of the sapodilla and related plants. In rural districts the exudation of resin found on the bark of conifers is used for chewing while still in the crude condition, but this substance is now refined and sold in our larger cities just as is the now more commonly used chicle-gum. An adjacent case is given over to:

Miscellaneous Specimens. Case 34.—In this case may be seen the substances used in the manufacture of soap, insect powders and related substances.

Beverages, including Chocolate. Cases 35 to 38.—Beverages are represented by both the non-alcoholic, as coffee, tea, maté or Paraguay tea, Jersey tea and fruit juices, and the alcoholic and malt beverages, as wine, beer, ale and porter. In the block of cases devoted to beverages will be found chocolate, which is derived from the seed of the chocolate tree (*Theobroma*). The collection there shown consists of the chocolate fruits, the principal commercial varieties of the seeds, unroasted and roasted, nibs of different degrees of fineness, germs, cocoa-liquor, cocoa-butter, cocoa-cake, and the same ground into "breakfast"-cocoa, with several varieties of confectioners' chocolate, as put up for the market.

Fixed and Volatile Oils. Cases 39 to 42.—The volatile oils form a large series, and in their manufacture various parts of the plants are used; for example, roots are used to make the oils of lovage-root, elecampane and muskroot; rootstocks furnish the oils of calamus, ginger, orris root and wild ginger; herbage is the source of the oils of pennyroyal, tansy, spearmint and peppermint; wood furnishes the material to make the oils of red cedar wood and sandalwood; bark is the source of the oils of birch, cinnamon and sassafras; leaves yield the oils of hemlock, spruce, pine, cedar, eucalyptus and wintergreen; flowers yield the oils of cloves,

lilac flower and orange flowers; fruits yield the oils of pepper, lemon, caraway and fennel; seeds furnish the oils of mustard, wormseed, nutmeg and almonds; while resins give us the oils of elemi, mastic, myrrh and frankincense.

The fixed oils, at least from a commercial standpoint, are less numerous than the volatile oils, and those in common use are mostly derived from the fruits and seeds of plants; for example, olive oil is contained in the fruit of the olive, linseed oil is contained in the seed of the flax plant, castor oil is stored up in the seed of the castor oil plant and cotton oil abounds in the cotton seed. Fixed oils differ from volatile oils in not completely evaporating when exposed to the air. In many cases the by-products resulting during the manufacture of the various oils are of considerable commercial importance. Some of these by-products are shown in the cases with the oils.

Plant Constituents. Cases 43 and 44. — This exhibit consists of a series of alkaloids, acids, glucosides and amaroids, albuminoids, resinoids and enzymes. These substances plants store up in their tissues, or in the tissues of one or more organs, and from them they are extracted for use in all branches of the arts, sciences and industries.

Sugars. Cases 45 and 46. — Sugar is a very important plant-product and it is of vast economic value. Sugar cane (*Saccharum*) is the basis of the world's sugar supply. The juice from the stems of the plant is boiled down and by other processes is made into the principal crude products shown in the cases and later into the commercial grades of sugar.

The juices of other plants are also used in making sugar, for example, in temperate regions, the sugar beet yields an enormous amount, the sap of the maple tree is made into maple sugar, while in tropical regions the sap of various palms, such as the cocoanut palm and the sugar palm, is made into palm sugar.

Starches. Case 47. — Starch, as in the case of many other substances, exists in and is consequently derived from the several organs of various plants, for example, the roots

of the cassava plant furnish the cassava flour and tapioca, while those of coontie yield coontie flour which is quite similar to sago, and those of the sweet potato plant furnish sweet potato flour. The rootstocks of the common potato plant abound in potato flour, while those of the arrow-root plant yield arrow-root flour. The stems of some of the sago palms and those of some of the true palms are the sources of sago flour. The fruits, both dry and fleshy, of a great variety of plants, contain starch; for example, those of the several grains, wheat, rye, and corn; while those of the banana yield the less common banana flour. The seeds of some plants are used as a source of starch, as for instance, those of the chocolate plant.

Cork and Paper. Cases 48 to 50.—Cork is the light outer bark of the cork oak, a tree indigenous to southern Europe. The substance, as we are accustomed to see it, is prepared by means of boiling the cork bark and scraping off the rough outer portion. The crude cork and many manufactured articles are shown in case number 49, and a large jacket of crude cork is exhibited near by, just as it was stripped from the tree.

Wood fiber, especially that obtained from the trunks of the spruce and poplar, enters largely into the manufacture of paper. In cases 48 and 50, the fiber is shown in its crude condition and in the various stages of refinement, as well as the various qualities of paper into the structure of which it enters. Here also are the several stages and substances connected with the production of straw paper.

Foods. Cases 51 to 68.—The very important section of vegetable foods occupies the cases on the north side of the west hall, opposite those containing the fibers. Here may be seen the various plants and parts of plants commonly used for food. In a few instances nearly the whole plant is available, as in the mushroom, the morel and the truffle. Usually, however, certain parts only are nutritious or desirable; a few examples of these are as follows: sweet potatoes, horseradish, carrots, and beets are roots: onions, potatoes and

Jerusalem artichokes are rootstocks; asparagus and poke shoots are young stems; lettuce, beet-tops, spinach and parsley are leaves; cauliflower and calamus-buds are inflorescences; corn, rice, bananas, mulberries, gooseberries, apples, tomatoes and oranges, are fruits; while peanuts, walnuts, hickorynuts, beans, almonds and chestnuts are seeds.

Drugs. Cases 69 to 86 and 169 to 186. — The east hall is given over to drugs. This, like the department of foods, is large and important. The active principles or medicinal agents are stored up in the tissues of the plant or in special organs. The great majority of refined drugs are derived from one or more of the parts of the plant, but in the case of the white agaric, ergot, Irish moss, Iceland moss, wintergreen, sundew, bitter-sweet, pennyroyal, boneset and tansy the whole plant is used.

A few of the crude drugs arranged under the several plant-organs they represent are as follows: sarsaparilla, poke-root, rhubarb, aconite, queen's root, senega root, marshmallow, man-in-the-ground and ipecac are roots; calamus, ginger, colic-root, Canadian snake-root, soapwort, mandrake, American ipecac, buckbean and stonewort are rootstocks; sandalwood and quassia chips are woods; sassafras medulla is pith; birch, slippery elm, sassafras, cinnamon, wild cherry, horsechestnut, cascara, linden and cinchona are barks; laurel, hardhack, cherry laurel, peach, senna, coca and eucalyptus are leaves; red-clover flowers, orange flowers, linden flowers, heart's-ease, borage flowers, safflower, marigold flowers, Roman chamomile, German chamomile and milfoil flower are flowers and flower-heads; saw palmetto, cardamon, cubebs, hops, star anise, poppy, rose hips, tamarind, Tonka bean and colocynth are fruits; colchicum seed, grain of paradise, betel nut, mustard, delphinium seed, almonds, calabar bean, Barbadoes nut, castor oil seed and henbane seed are seeds.

Woods. Cases 87 to 168. — The east wing is occupied by woods. The exhibits fall under two main divisions, the one consisting of a series of wood-specimens from all parts of the

world, and crude wood-products such as pipes, canes, shoes, sandals, utensils, and carbons or charcoals; the other being a synoptic collection illustrating North American dendrology.

2. THE MUSEUM OF SYSTEMATIC BOTANY

This occupies the entire second floor of the building, and is designed to illustrate by specimens, drawings and photographs, types of all the natural families of plants, beginning with those of the simplest structure and ending with the most complex. It consists of three series of objects:

(*a*) The general synoptic collection.

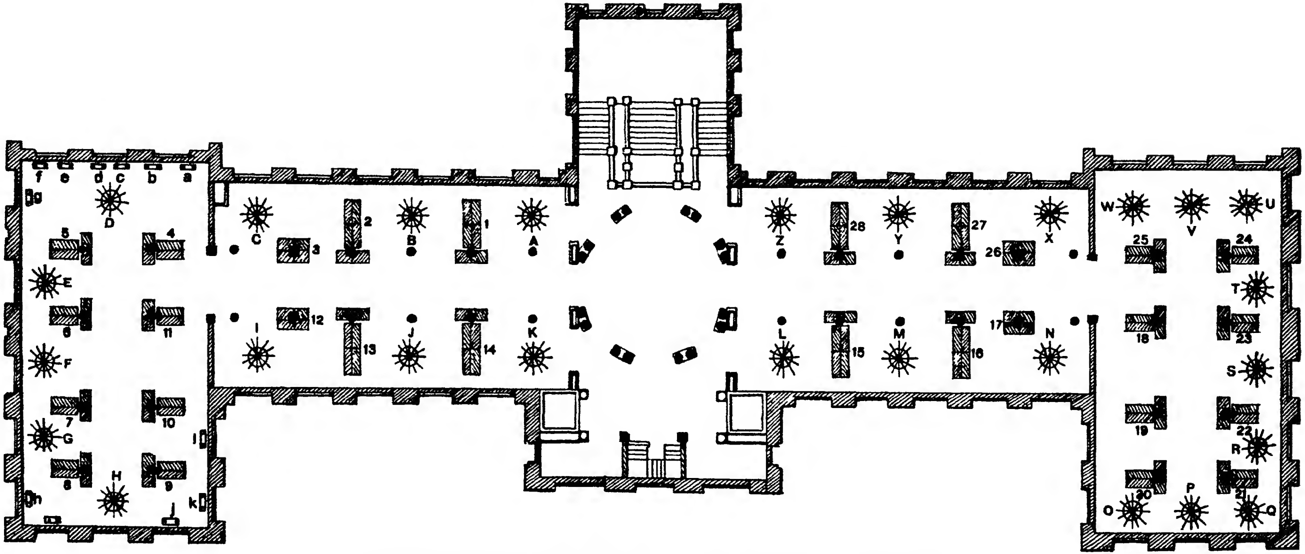
(*b*) A series of microscopes showing selected specimens.

(*c*) Illustrations of the local flora.

a. Synoptic Collection. This is designed to illustrate the plant world. A series of characteristic objects is installed as a basis for illustrating each plant-family. These specimens are accompanied as far as possible by plates, drawings or photographs, while on the shelves are arranged additional objects, such as flowers, fruits, woods, specimens of fossil plants and models of various organs of plants, all intended further to illustrate the structural characteristics of the different groups. This collection is arranged according to the most natural and thus far most generally satisfactory interpretation of the interrelation of the plant-families; it may be considered as falling into two main series, namely, the flowerless or spore-bearing plants and the flowering or seed-bearing plants.

The flowerless plants fall into three subkingdoms: (1) the Thallophyta, in which the plant-body is not differentiated into stems and leaves, represented by the slime-moulds, the bacteria and other micro-organisms, the seaweeds, the fungi and the lichens; (2) the Bryophyta, represented by the mosses and their immediate relatives; and (3) the Pteridophyta, including the ferns and the fern-allies.

The Thallophyta (cases 1 to 36), may be defined as plants without true roots, stems or leaves, but notwithstanding their simple structure they exhibit an infinite variety of form and color.



FLOOR-PLAN. MUSEUM OF SYSTEMATIC BOTANY

1–28. Synoptic Collection.
1– 8. Case 1. Slime-moulds.
Cases 2–16. Sea-weeds.
Cases 17–36. Fungi.
9–11. Cases 37–40. Hepatics.
Cases 41–48. Mosses.
12 and 13. Cases 49–55. Ferns and Fern-allies.
12 28. Cases 56–58. Cone-bearing Plants.
Cases 59–128. Fruit-bearing Plants.
A–Z. Local Flora.
a–k. Microscope Exhibit.

The Myxomycetes or slime-moulds (case 1), standing at the bottom of the plant scale, occupy the first exhibition case placed at the right hand side of the stairway from the main floor. They are thallophytes having neither chlorophyl nor (in their vegetative condition) a cell-wall. These very simply constituted plants usually grow upon and derive their nourishment from decaying organic substances. They vary greatly in size, some being exceedingly minute, others assuming the form of relatively large irregularly shaped masses spreading in all directions as they grow. Most of the plants are small, and the structure is very delicate, in fact some are so fragile that a mere breath of air will ruin them.

Following the slime-moulds stand the cases devoted to the algae or seaweeds (cases 2 to 16), which may be briefly defined as thallophytes with chlorophyl, the green coloring matter of plants. The plants of this series are much more variable in form than those of the preceding, and are also much more numerous. Some forms are microscopic, others attain considerable size. The first case of the series is occupied by representatives of the blue-green algae (case 2) and the diatoms. The plants of these two groups are minute, so much so that in most cases the individuals can be well seen only with the aid of a microscope. As one finds them in nature they commonly form slimy or oozy masses which are not particularly attractive to the naked eye, but under a compound microscope they are of very great interest. Following the series just mentioned are the green seaweeds (case 3), the group which includes the plants that are sometimes called the pond-scums, green slimes, green felts, and stoneworts. Some of these are microscopic; however, some of the green seaweeds attain a considerable size and begin to look a little more like what are popularly termed "plants." After the green seaweeds come the brown ones (cases 4 to 8), and here the largest kinds are included. In their tissues is found a brownish pigment which obscures their green coloring matter. To this group belong the widely distributed "gulf-weed" or "sargasso-weed" (*Sargassum*) and the gigantic "great

kelp" of the Pacific Ocean, which is said to attain seven hundred feet in length. The seaweeds culminate in the red algae, a group in which the plants show some shade of red, pink or purple; these (cases 9 to 16) exhibit a marvelous range of form and color. The last group of cases containing this series is given to the group of red algae which are known as the corallines, on account of their outward resemblance to the corals. These plants are thoroughly permeated with lime and are often as hard and stone-like as any coral, and build up reefs in the tropical oceans much as the corals do.

The next great type of plant life is the fungi (cases 17 to 36). These, like the plants of the preceding group, vary greatly in size and complexity of structure; but, unlike them, they are devoid of chlorophyl, the characteristic green matter which enables other plants to build up complex food for their nourishment, and consequently they are wholly different in their mode of life. Some are parasitic, deriving their nourishment from living plants and causing enormous damage to crops; others are saprophytic, deriving it from the remains of dead organisms; while others are symbiotic, living in such relationship with chlorophyl-bearing (green) plants that they mutually nourish one another, as in the case of lichens and mycorhizas. There are five generally recognized series here: First we have the stalked-spored fungi (cases 17 to 28). This series falls into two groups, the one typified by the "rusts" and "smuts" which are commonly parasitic on the leaves and fruits of other plants; the other the great saprophytic group well known through the mushrooms, bracket-fungi, stink-horns and puff-balls. Second in the series is the group known as the imperfect fungi (case 29). In this group the spores are borne directly on the threads or "hyphae" which constitute the vegetative portion of the organism. They are often parasitic on the leaves and on the bark of both wild and cultivated plants. Third in this series are the spore-sac fungi (cases 30 and 31). In these plants the spores are borne in delicate membranous sacs, called asci, which in the more complex forms are collected

into bodies of various shapes. The plants vary greatly in size and structure and are both parasitic and saprophytic. To this group belong the yeasts and mildews. Some plants grow above the surface of the ground, as in the case of the morel; while others are subterranean, as in the case of truffles. Next in order are the alga-like fungi (case 32); these vary in form from simple masses of protoplasm to simple or branching threads. Here belong many of the moulds and similar forms which grow both on other plants and on animals. The fifth and in many respects the most interesting of all the groups is that consisting of the lichens (cases 33 to 36). The fungi thus far considered are either parasitic or saprophytic in their mode of life; the lichens form an independent symbiotic group, each lichen consisting of a fungus and an alga living together, the one nourishing the other. The lichens are quite familiar to most people as plants of more or less leathery texture growing on rocks, on poor soil or on the trunks of trees.

A step forward brings us to the Bryophyta, or seedless plants with roots, stems and leaves, but without vascular tissue (cases 37 to 48). This group is best known through the mosses, which form its largest division; but of simpler structure are the hepatics or scale-mosses (cases 37 to 40); although they were formerly associated with the true mosses, their tissues are much less differentiated than those of the mosses and the structure of their various organs much less complicated. The stems and leaves of the hepatic plant are sometimes combined into a flat thallus-like body which creeps closely on the ground or other objects and resembles in aspect some of the more simply organized plants. The leaves, too, are more like scales than in the true mosses and they do not have a midvein. These differences alone enable one to distinguish a hepatic from its relatives by the unaided eye or at most by the use of a lens. In addition to these characters, the capsule or the receptacle which bears the spores, or reproductive bodies, usually splits into four valves when full-grown and the spores themselves are accompanied

by spiral threads called *elaters*. The favorite habitat of hepatics is wet places, and mountains continually steeped in clouds yield a surprising variety of forms. Closely related to the hepatics is the group Anthocerotes; these plants may however be distinguished by the presence of a central axis or column (columella) in the capsule, and there are several other important structural differences in their tissues.

The mosses (cases 41 to 48) follow the hepatics in order of development and complexity; they differ from them, however, in many respects. The stem and leaves have more differentiated tissues, and the leaves usually have a midvein. The moss capsule generally opens by a lid under which there are commonly appendages to aid in scattering the spores, which in this case are not accompanied by spiral threads as they are in the hepatics. The mosses fall into three primary groups: First the "peat-mosses" (*Sphagnum*) which differ from the rest of the mosses in the development of the tissue-structure of the capsule, and the spores; they grow in swamps and other wet places, and their accumulation forms peat. The "black mosses" (*Andreaea*) differ from both of the other groups in the valvular capsule; they grow on dry rocks. The true mosses vary exceedingly in size and aspect. An examination of the specimens in the exhibition cases will convey to the mind a better idea of this group than a description. They grow under all kinds of conditions from dry rocks to deep water. Many of the kinds grow on almost any kind of rock, earth or bark of trees, while certain ones are more particular as to their habitat. Some will thrive only on limestone, which they often gradually disintegrate and partially preserve in the masses of closely set plants as a calcareous tufa; other species prefer ground that has recently been burnt over, as species of *Funaria* and *Leptobryum*, while others grow only on the bones of dead animals or in places where animal refuse has accumulated.

Next higher in the plant kingdom is the subkingdom Pteridophyta, or ferns and fern-allies, the seedless plants with roots, stems, leaves and woody tissue (cases 49 to 55). The ferns

as a group perhaps attract the attention of a greater number of people than any other group of plants. However, associated with what are usually known as ferns are the fern-allies, for example the "horse-tails" (*Equisetum*), "lycopods" (*Lycopodium*) and "quillworts" (*Isoetes*), but these are usually less conspicuous than the "ferns." Fern-plants differ from all the plants of simpler organization in having vascular (woody) tissue, that is, a system of vessels for conducting sap through the different parts of the plant-body. They exhibit an almost infinite variety of form; their stems may be underground, horizontal on the ground, or erect; the leaves are either simple or compound, and sometimes perform both the work of foliage leaves and that of bearing the spore-cases (ferns), while in other cases some of the leaves have become changed into mere spore-bearing organs (horse-tails).

The flowering plants (cases 56 to 128) comprise a single subkingdom, the Spermatophyta or seed-bearing plants. This extensive group seems to have followed two independent lines of development and consequently the plants fall into two well marked groups, the first being the gymnosperms, cone-bearing plants, or plants in which the seeds are borne exposed in variously shaped cones (cases 56 to 58). This is a comparatively small group, but exhibits great diversity, including plants ranging from straggling shrubs or vines to the largest trees. The leaves, too, vary from structures resembling needles or scales to expanded fern-like structures of considerable variety. In a former geological age these plants were the dominant seed-bearing plants, but now the second group of the spermatophytes largely predominates; namely, the angiosperms, fruit-bearing plants, or plants in which the seed is borne in a seed-case. These plants also existed in the later geological ages, and now form the most important and conspicuous part of the vegetation of the earth. The fruit-bearing plants (cases 59 to 128) fall into two divisions, the one in which the seed contains a single leaf, the monocotyledons (case 59 to 71); the other in which the seed contains two leaves, the dicotyledons (cases 72 to 128).

b. Microscope Exhibit. The exhibition microscopes occupy small stands in the West Wing of the second floor. In front of the windows on the right as one enters the wing are shown a few of the simplest and smallest forms of plant life. Under the first microscope is a preparation showing the vegetative condition of one of the slime-moulds, organisms in which the characteristics of plant and animal are so little differentiated that it is nearly impossible to affirm with confidence that they belong either to the one kingdom or to the other. In the vegetative stage — the stage here exhibited — the organism is strikingly similar in its essential attributes to some of the lower animals. Later, in the reproductive stage, there is at least a superficial resemblance to the fungi, which are undoubted plants. By means of the second microscope the spore-bearing stage of a slime-mould may be seen. The stalks and the netted framework of the spore-case walls remain, but the spores have mostly fallen. A few of the spores, however, appearing like minute dark dots, can be detected, adhering to the network. Under the lenses of the third microscope are representatives of the diatoms — one-celled organisms, some of which have the power of animal-like locomotion. The living substance of each cell is enclosed and protected by a hard transparent glassy wall consisting of two halves, one of which fits into the other like a band-box into its cover. Following this are shown "sea mosses," or "seaweeds," as they are commonly known, and closely related minute plants which inhabit fresh water and belong to groups often referred to in popular speech as "pond-scums" or "ooze." In the natural unmagnified condition, many plants of this sort seem quite the reverse of attractive, but when placed under a sufficiently powerful microscope many of them reveal a rare beauty. The "sea mosses," or "seaweeds," gradually lose much of their natural beauty of coloration on prolonged exposure to the light, but the prevailing elegance and symmetry of form and structure persist.

Following the plants of the seaweed type are several representatives of the smaller fungi. The specimens exhibited

are chiefly from among those which grow upon decaying organic refuse. One interesting parasite exhibited is a fungus parasitic upon another fungus, which, in turn, is a parasite on the leaves of the common lilac. Another fungus shown lives chiefly within the cells of the underground parts of one of the orchids, yet it can scarcely be called a parasite, inasmuch as its presence in the tissues of the orchid is beneficial to the orchid as well as to itself. Of the fungi which live upon decaying refuse matter, *Ascobolus* is one of the more interesting among those selected for exhibition. In this, the spores, or propagating cells, are borne in groups of eight within transparent ellipsoidal sacs, and at maturity these sacs, each enclosing eight spores, are ejected with considerable force. Under two microscopes are shown sections of lichens, illustrating their mode of reproduction and the fact that a lichen consists essentially of two organisms, a fungus and an alga, intimately associated and constituting what for many purposes may be looked upon as a single organism.

Then follow specimens of the liverworts or scale-mosses, plants in which the differentiation of the vegetative body into stem and leaves becomes first clearly evident. One of these, a *Frullania*, has a part of each leaf peculiarly modified so as to form a reservoir for water. By aid of this device, the frullanias and their allies are able to thrive in drier situations than are in favor with most of the order to which they belong. Preparations are exhibited showing also the vegetative structure and methods of reproduction of the true mosses. Especially interesting is the "peristome" of one of the mosses, which is a fringe of peculiar appendages surrounding the mouth of the little urn in which the minute dust-like spores are borne. These appendages move about as a result of changing conditions of moisture and these mechanical movements assist in scattering the spores. A somewhat analogous device is found in connection with the spores of the equisetums or horse-tails, though the appendages in this case are attached to the spores. Following the slide illustrating this feature of the horse-tails is one showing the

spores and spore-cases of the common polypody. The spore-case here is provided with a sort of spring, by the action of which the spores are violently ejected, catapult-fashion. The remaining preparations show the structure of the leaf-stalk and root of common types of ferns.

c. Local Flora. In this collection it is designed to illustrate every plant-species growing naturally or without cultivation within one hundred miles of New York City. For the most part specimens of the plants themselves are used, but in cases where the structure of the plants renders this method undesirable, or impossible, a photograph or a drawing is substituted for the plant-specimen. This collection is displayed in swinging frames which are placed so as to correspond in a general way to the sequence of the cases of the synoptic collection already described ; thus, the first stand is near the first museum case as one enters the west hall from the top of the staircase. All of the plant groups are here represented by those members that occur locally, and the characteristics of the several groups as mentioned under the Synoptic Collection also apply here.

3. THE MUSEUM OF FOSSIL BOTANY

This collection, installed in the basement, is designed to show the successive stages of evolution through which the ancestors of our living flora have passed since the time of the first appearance of plant life on the earth, as far as the remains of extinct plants have been preserved. The arrangement adopted is therefore based upon the sequence of the geological time divisions : Eozoic, Palaeozoic, Mesozoic and Neozoic, and their sub-divisions into periods ; Laurentian, Cambrian, Lower Silurian, Upper Silurian, Devonian, Carboniferous, Triassic, Jurassic, Cretaceous, Tertiary, Quaternary and Recent or Modern. This arrangement is therefore geological, but incidentally it is also biological, and is based on the same system as that on which the synoptic collection of the museum of systematic botany is arranged, inasmuch

as the plants of the earlier periods are low in the scale of life, consisting of thallophytes and pteridophytes and plants of uncertain botanical determination, while those which appear in the successively later periods are of successively more complex types, represented by cycads, conifers and both monocotyledonous and dicotyledonous plants closely related to our living flora.

The series of exhibits begins in the first case to the left as one enters the east wing of the basement. The sequence of the specimens in the wall cases corresponds to that of the floor cases.

In the first floor-case may be seen representatives of Eozoic and Palaeozoic Time: Laurentian, Cambrian, Lower Silurian, Upper Silurian, Devonian, and Carboniferous Periods. At the north end are specimens of graphite of eozoic age and of anthracite and bituminous coal of carboniferous age, showing the transformation of vegetable matter into the ultimate condition of pure carbon in the form of graphite or "black lead" in the oldest rocks. Many of the specimens in this case, classed as algae, are of uncertain botanical relationship, as the structure of the primitive plants was not well adapted for preservation as fossils. For example, some organisms appear as mere filamentous strips of graphite in white limestone, without any trace of the original structure remaining, while others may be seen as casts and impressions which closely simulate in general appearance different parts of the sea-weeds now existing. In this series of problematic fossils are also included a number of forms at one time definitely classed as plants but now by some assumed to be of animal or inorganic origin; namely, *Scolithus*, which may be caused by worm burrows; *Phytopsis*, which may be a coral; *Plumalina*, which may be a hydroid; *Dendrophycus*, which may be current-markings; and *Dictyolites*, which are most likely sun-cracks. All of these, however, have at one time or another been definitely regarded as the remains of marine plants and were originally so described and classified.

In this case are also the remains of the earliest fern-plants

and their allies (Pteridophyta) represented by *Lepidodendron*, *Sigillaria* and *Calamites*, and the early seed-bearing plants, the cone-bearers (Gymnosperms), represented by *Cordaites*, with the fossils under *Trigonocarpon*, *Rhabdocarpon*, and other genera.

In the second floor-case are representatives of Palaeozoic Time: Carboniferous Period.—The specimens in this case are exclusively ferns or plant-remains which were originally described as ferns but which are now thought to belong to a different group, the Cycadofilicales, that is, plants that had characteristics of both the ferns and the sago-palms, but rather more closely related to the cone-bearing trees than to the ferns.

The third floor-case contains types of Mesozoic Time: Triassic and Jurassic Periods.—The plant-remains in this case are mostly sago-palms or cycads, with some other cone-bearers and fern-plants.

The fourth floor-case embraces plant-remains from the rocks of Mesozoic Time: Lower and Middle Cretaceous Period.—These specimens represent the first appearance of the fruit-bearing plants (angiosperms), the type which is dominant in the existing flora. The genera are in most instances apparently identical with those now in existence, but the species are extinct. The plants of the Lower Cretaceous period consist largely of ferns and cone-bearers, while those of the Middle Cretaceous show a preponderance of seed-bearers. The specimens from the Dakota Group of Western America are exceptionally fine, many of them being perfectly preserved and showing both cast and impression of the same leaf.

The fifth floor-case contains the plant remains of Mesozoic Time: Middle and Upper Cretaceous Period. Here may be seen interesting specimens of the fossil floras of both eastern and western North America, including the ancestors of our living tulip-tree (*Liriodendron*).

In the sixth floor-case may be seen the plant-remains of Neozoic Time: Tertiary, Quaternary and Recent or Modern

Periods. The specimens in this case complete the sequence of plant life on the earth and bring it up to modern times. A number of specimens at one end of the case show the methods of preservation by petrifaction, incrustation and carbonization and on the upper shelf is a series of specimens from Quaternary and more recent swamp deposits which show how the conversion of living plants into fossils, a process now going on, has its beginning.

The specimens in the adjoining wall-case further illustrate the characteristics of the plants of the late geological periods and the methods by which the various plant structures have been preserved.

A number of specimens of silicified woods show the method of preservation by what is known as petrifaction, or conversion into stone, in which the woody structure is replaced by mineral matter. Other specimens show preservation by incrustation, in which mosses and the stems of reeds are coated or incrusted by mineral matter deposited from springs; while on the upper shelf and on the top of the case are logs and stumps from old swamps and interglacial deposits, in which the wood has been partially carbonized, or converted into lignite, by the slow process of natural distillation. This process represents the beginning of the conversion of vegetable tissue into coal.

LECTURES

Other features of the museum building include the large public lecture hall, with a seating capacity of over seven hundred, which occupies the western end of the basement. It is equipped with an electric projection-lantern, and public popular lectures covering a wide field of botanical and horticultural subjects are delivered here on Saturday afternoons in autumn and spring; these are fully illustrated by means of a very extensive collection of lantern slides owned by the Garden which is constantly being increased; a noteworthy part of this collection is the series of delicately and accurately colored slides of flowers, fruits, trees and shrubs, by Mrs.

Adelaide S. Van Brunt, from photographs made during many years by her late husband, Cornelius Van Brunt.

A series of lectures to the pupils and teachers of public schools, designed to illustrate and supplement their work in nature study, is given in the large lecture hall on afternoons in autumn and spring, and these lectures are attended by many thousand children.

A special series of lectures designed for teachers alone is given on Saturday morning in the autumn and spring.

The Horticultural Society of New York holds several of its monthly meetings at the Garden, using the large lecture hall, and also uses the basement museum hall adjacent for the purpose of exhibitions.

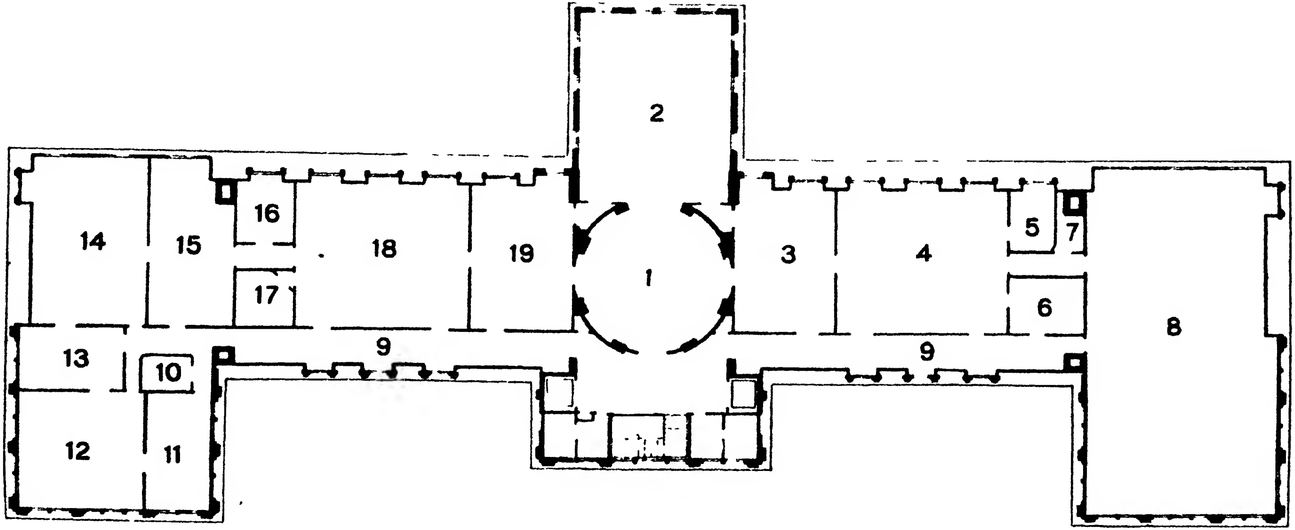
The Torrey Botanical Club holds monthly meetings from October to May, on the afternoon of the last Wednesday of each month, in the museum building, and many of its field meetings on Saturday afternoons throughout the season are held at the Garden.

THE LIBRARY

The library of the Garden is located in the center of the upper floor of the museum building, and is available for consultation, by permission. It has been formed by the Board of Managers in order to provide for the use of students, all the literature of botany, horticulture and related sciences, and is rapidly becoming one of the most complete collections in the world of books and pamphlets dealing with these subjects.

THE HERBARIUM

The herbarium consists of dried specimens of plants systematically arranged in cases; it occupies the greater portion of several rooms on the upper floor of the museum building, and is available for consultation by permission. It contains prepared specimens of all kinds of plants from all quarters o the globe, and is the most extensive and complete collectio of its kind in America.



PLAN OF UPPER FLOOR OF MUSEUM BUILDING

1. Library Reading Room.
2. Library Stack Room.
3. Director's Laboratory.
4. Herbarium of Fungi.
5. Curator's Room.
6. Moss Herbarium.
7. Storeroom.
8. Main Herbarium.
9. Hall.
10. Photographic Dark Room.
11. Balance Room.
12. Chemical Laboratory.
13. Study.
14. Physiological Laboratory.
15. Study.
16. Study.
17. Physiological Dark Room.
18. Morphological Laboratory.
19. Herbarium of Algae.

THE LABORATORIES

Laboratories and working rooms for research are provided on the upper floor of the museum building, and properly qualified students of botany are permitted to make use of this equipment, under the direction of some member of the staff of the Garden. The equipment is designed to meet the needs of a very broad field of investigation including plant chemistry, pathology, physiology and morphology. A valuable series of old microscopes, illustrating the history and development of that instrument, has been presented by Mr. Charles F. Cox.

3. The Pinetum

[COLLECTION OF CONE-BEARING TREES]

The collection of cone-bearing trees, technically known as the Pinetum, because the pines are the most abundant of these trees, is planted over a space of about 30 acres in the southwestern part of the grounds, extending from the approach to the elevated railway station southeast to the herbaceous garden, and northeast to the museum building and the borders of the hemlock forest. The species of trees are grouped in genera, as shown by the accompanying plan. The planting out of these trees was commenced in 1901, and, as rapidly as the finished grades of this portion of the grounds have been established and the driveways and paths completed, additional planting has been done; the collection will continually become more complete year by year as additional species are secured; many of these have to be raised from seed, and the process of establishing a collection of conifers thus requires much time.

Commencing at the approach to the elevated railway station we find the Douglas spruce (*Pseudotsuga mucronata*) planted in the space between the traffic road and the park driveway to the left of the path leading to the Conservatories; this tree is a native of western North America from the Rocky Mountains to the Pacific Coast and is sometimes known as Red Fir. In the far northwest it sometimes becomes 180 to 210 feet high, its trunk occasionally as much as 3½ feet

in diameter, but in the Rocky Mountains it is seldom one-half this size, and trees taken from the far northwest do not thrive well on the Atlantic coast, owing to the much greater rainfall which they naturally receive there; the cones of the Douglas spruce are from 2 to 4 inches long, pendant on the branches, their scales rounded and shorter than the bracts which project beyond them.

The Hemlock Spruces (*Tsuga*) are planted between the approach to the elevated railway station and the power house, and are represented by the Canadian hemlock spruce (*Tsuga canadensis*), the same species which forms the interesting forest on the hills bordering the Bronx River within the Garden, and indicated on the general plan as the hemlock grove. This tree occasionally becomes about 90 feet high, with a trunk up to 12 feet in diameter, and is distributed throughout northeastern North America, extending southward along the mountains to Alabama, northward to Nova Scotia and westward to Minnesota. Its bark is the most important tanning substance in the United States and a great many trees are annually felled to obtain it; its wood furnishes a cheap lumber of little strength and durability. The Carolina hemlock (*Tsuga caroliniana*), from the mountains of southern Virginia to Georgia, may also be seen here, as well as the Japanese hemlock spruce, to which the name *Tsuga* was first applied.

In the area to the westward of the conservatories, and bounded by the surrounding paths, are the firs (*Abies*). These can at once be distinguished from the spruces (*Picea*) by the erect, instead of pendulous, cones, and by the smooth branchlets. The wood of the firs is usually soft and not durable, so it makes poor lumber. Specimens of the balsam fir will be found here; this is widely distributed over northern North America, and from it is obtained canada balsam or balm of fir, used in the arts and in medicine. The Japanese silver fir is an attractive plant, with its dark green stiff foliage. Veitch's silver fir, from Japan, and said also to occur on the neighboring coast of Manchuria, is one of the

best for ornamental purposes. It was discovered in 1860 on the famous Japanese mountain, Fuji-yama, by Mr. Veitch, for whom it is named. The red fir, from Washington and Oregon, with its blue leaves, borne almost erect and apparently on but one side of the branchlets, makes a conspicuous object. In its native country it sometimes attains a height of 250 feet. Its wood is sometimes used in the interior finishing of buildings. Among other firs here are: the white fir, from western North America, sometimes growing to a height of 200 to 250 feet; the Siberian fir, from northern Europe and Asia, yielding a soft lumber in general use and a bark used in tanning leather; the common silver fir, from Europe; Nordmann's silver fir, from the Caucasus; the Sicilian silver fir, from Asia Minor; and the Nikko silver fir, from Japan.

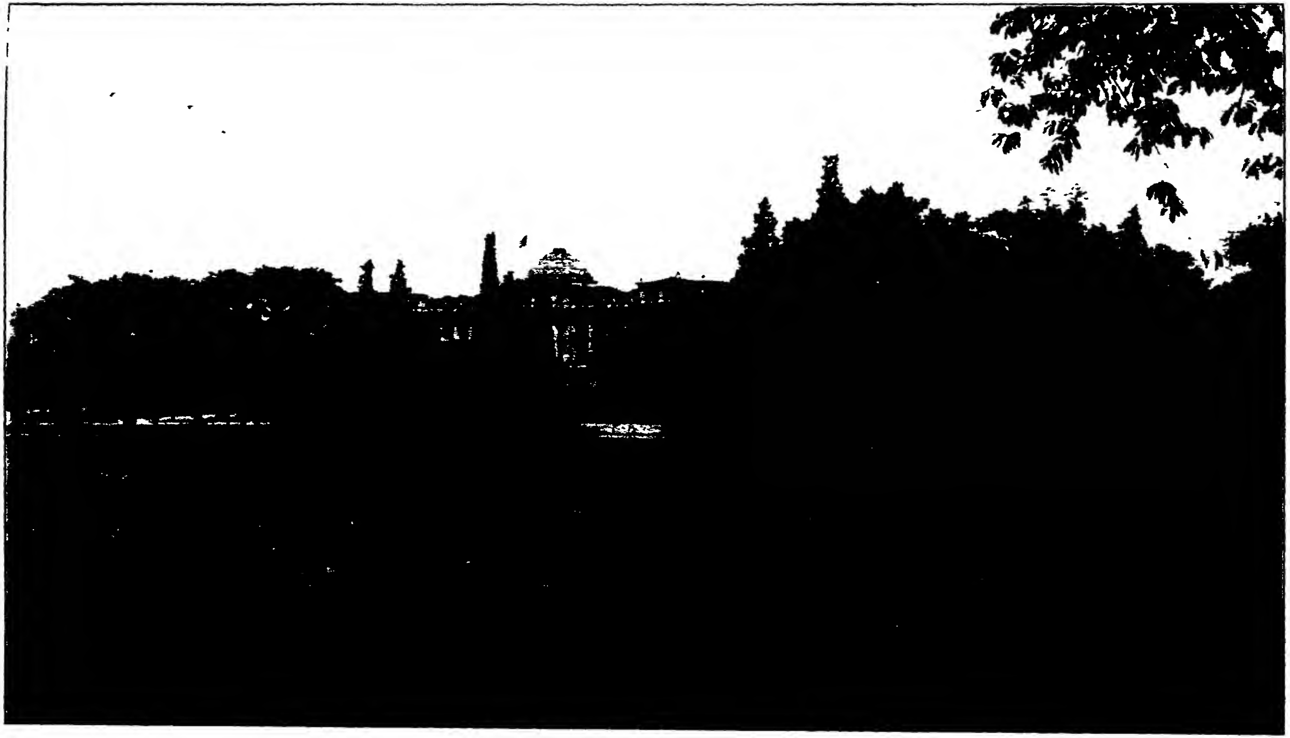
The spruces (*Picea*) are located in the area to the northeast of the firs. Some of the spruces are most valuable timber trees. The oriental spruce, from Asia Minor, is present in several specimens. One of the hardiest spruces for our climate, and a general favorite, is the Colorado, or blue, spruce, the young foliage of which has a decided blue color, whence its name. It usually grows about 100 feet tall in its native country. The Norway spruce, with a number of horticultural forms, makes a group on the highest portion of the area devoted to the spruces and is a commonly cultivated tree. It furnishes a useful timber, which is known as "white deal" in England, and is largely used in the manufacture of musical instruments. The resinous exudation of this tree is known as Burgundy pitch, which, in combination with other ingredients, is used in Germany to line beer casks. Other spruces of interest here are the Yesso spruce, the wood of which is much used in Japan; the white, or Engelmann's, spruce, from western North America, the wood of which is largely manufactured into lumber and the bark sometimes used in tanning; the Servian spruce, one of the largest and most valuable timber trees of Europe; and the tiger's-tail spruce, from Japan, introduced about forty years ago, and one of the hardiest Asiatic species in cultivation.

The space allotted to the pines (*Pinus*) embraces the region to the eastward of the spruces and public conservatories, extending across the road to the herbaceous grounds. Most of the pines are of great economic importance, furnishing large quantities of lumber, turpentine and resin. Most of the white pines will be found on the westerly ridge of the herba ceous grounds and across the road from this to the eastward of the conservatories. Among these is our common white pine and several of its horticultural varieties. It is perhaps the most valuable of the timber trees of northeastern North America, large quantities of lumber being derived from it; near this is the Himalayan pine, resembling it, but with longer leaves. This sometimes attains a height of 150 feet in its native country, where its lumber is much used for building and other purposes. In this region will also be found the Cembra or Swiss stone pine, of southern Europe and northern Asia; and the Macedonian pine, of southeastern Europe.

In the area to the eastward of the conservatories will be found, among others, the Corsican pine, with a hard strong wood which is much used; the variegated Scotch pine, with the young leaves variegated; and a number of plants of both the white pine and Himalayan pine.

In the region to the north of the white pine tract, and on the westerly side of the herbaceous grounds ridge, will be found the Tyrolese mountain pine, from the Tyrolese and Venetian Alps, forming a group of some dozen plants; near this is the Japanese red pine, and two horticultural forms of it, from Japan. Following these to the north are a number of plants of the Jack pine, or Banks' pine, native of northern North America. Its wood is sometimes used for fuel, and was valued by the Indians for the frames of their canoes.

In the area to the eastward of the spruces are a number of other pines. The Corean pine, one of the white pines and a native of eastern Asia, is located next to the spruces. Near this is the Table-mountain pine. On the high ground to the eastward of the above is the Scotch pine, the principal timber



pine of Europe and Asiatic Russia. On the easterly slope of this higher land and on the lower ground nearby will be found, among others, the red or Canadian pine, from north-eastern North America, the wood of which is largely used for building purposes and for masts, piles, and spars; the small-flowered pine, another of the white pines and from Japan, where it is frequently used by the Japanese in producing their miniature trees; the Japanese black pine, also from Japan and useful for its wood; the Austrian pine, found native in Austria, Servia and Roumania; and the yellow, or bull, pine, from western North America.

In the triangle located midway between the south gate and the conservatories, are the American cypresses (*Taxodium*), in two species: the cypress, or bald cypress, and the pond cypress. These, like the larches (*Larix*), and a few other coniferous trees, shed their leaves for a portion of the year. They form vast areas, in parts of the southern states, called cypress swamps. Their timber is of economic importance and their bark is rich in tannin. None of the true cypresses (genus *Cupressus*) are hardy with us.

At the northern end of the swale in which the herbaceous grounds are located, is a miscellaneous collection of coniferous trees, and also the members of the yew family (Taxaceae). Among the miscellaneous coniferous trees here are: the Japanese cedar, a tree which is barely hardy in this latitude, and of which only a single specimen is at present in the collection; the umbrella pine, from Japan, a very decorative plant; the deodar, or Indian cedar, from the Himalayan region; and the Mt. Atlas cedar, from northern Africa. The larches (*Larix*) will also be found in this neighborhood, on the ridge. These are deciduous trees, the wood of which is of great economic importance. Specimens of the European larch are here, and also of the Japanese larch. The genus *Pseudolarix*, distinguished from the larches in having the scales of the cones deciduous, is represented by its single species, the golden, or Chinese, larch; this, like the true larches, is a deciduous tree.

The yew family (Taxaceae) is represented by two genera. Of the true yews (*Taxus*), there are: the American yew, or ground hemlock; the English yew, and several of its horticultural forms, the wood of which was highly prized in ancient times for the manufacture of bows; and the Japanese yew. The cluster-flowered yew (*Cephalotaxus*) is represented by Fortune's cluster-flowered yew, from northern China, and the iraga boku, of the Japanese, from Japan. Other representatives of this group will be found in conservatory houses nos. 12 and 13.

On the westerly corner of the conservatory terrace and in the immediate vicinity are located the retinisporas, which are so commonly cultivated as decorative plants. There are many horticultural forms here represented, but they are all variations of two Japanese trees: the Sawara cypress (*Chamaecyparis pisifera*); and the Hinoki cypress (*Chamaecyparis obtusa*). The latter species is frequently used by the Japanese in their dwarfing process. The names borne by the various horticultural forms have been suggested by some peculiarity in coloring or in manner of growth. Other species of the genus *Chamaccyparis* will be found in the low ground along the south walk, not far from the south gate.

On the easterly corner of the conservatory terrace, opposite the retinisporas, is a part of the juniper, or red cedar (*Juniperus*), collection. The remaining and larger portion of this collection will be found on the easterly end of the area lying between the driveway and the traffic-road south of the conservatories. In these two regions will be found many species and varieties of these plants. The common juniper, of north temperate regions, is one of these; also the Irish juniper, a form of this, of compact and strict habit. The red cedar, so common in a wild state in the grounds of the Garden, finds representatives in many horticultural forms. The low cedar, of North America, Europe and Asia, is a pretty dwarf species. The savin juniper, of Europe and northern Asia, and its American representative, the prostrate juniper, of northern North America, are both neat low-grow-

ing sorts. The Chinese juniper, and its striking form, of columnar habit, known as variety *pyramidalis*, are each present in a number of specimens. There are still other varieties of the Chinese juniper represented here.

At the westerly end of this same area is the arbor vitae (*Thuja*). The species of this genus produce a durable wood, which is of especial value where there is contact with the soil. The Japanese arbor-vitae is represented by a single specimen. The common arbor-vitae, or white cedar, from northeastern North America, is fully represented, not only by the typical form, but by many horticultural varieties, some of them very decorative. The wood of this tree is valued for fence posts, railway ties, etc., and from its young branches fluid extracts and tinctures are made which are used in medicine. The Chinese arbor vitae, from China and Japan, has a number of specimens representing it and some of its horticultural forms.

The maiden-hair tree family is represented by a single species, the maiden-hair tree, several specimens of which may be found on the southern portion of the westerly ridge of the herbaceous grounds. This interesting tree, with its fan-shaped leaves, is a remarkable relic of a type of vegetation which was common and widely distributed in tertiary geological time, but is now restricted to eastern temperate Asia in this one species, *Ginkgo biloba*.

4. The Herbaceous Grounds

The collection of hardy herbaceous plants is situated in a valley southeast of the public conservatories, and between the main driveway and the western border of the woods fringing the hemlock grove. This valley is about 500 meters long and averages about 100 meters wide. A small stream runs through the valley from north to south and is here and there broadened out into pools. The collections are arranged in two series: (*a*) The systematic plantation; (*b*) the morphological garden; a third series (*c*) to illustrate economic plants,

is now being installed; the viticetum (*d*) or collection of vines, both woody and herbaceous, is planted at an arbor just east of the northern part of the valley.

(*a*) Systematic Plantation

This is located in that portion of the valley south of the driveway crossing it, and here the plants are grouped by natural families in botanical relationship. To the east of the brook are the seedless plants, represented by the ferns and their allies, and the families of seed-bearing plants belonging to the large endogenous division, or those with parallel-veined leaves and with one seed-leaf (monocotyledons). To the west of the brook are the families belonging to the exogenous division of plants, or those in which the leaves are usually net-veined and which have two seed-leaves (dicotyledons). This latter group embraces the larger part of the plants in the collection. Along the brook or in it, will be found many aquatic plants, representing in some cases families which are exclusively water-lovers, while in other cases they are aquatic representatives of families occurring in the immediate vicinity in the beds. In this plantation, the family groups are arranged substantially in a sequence beginning with those of simpler organization and proceeding to the most complex.

The series commences in the southern corner of the valley at the foot-path entrance, where the hardy ferns and their allies will be found, including species from all parts of the north temperate zone. Among these may be mentioned the ostrich fern, the cinnamon fern, Clayton's fern, the royal fern and the American royal fern, the brake or bracken, and a number of species of the shield-ferns and of the spleenworts. A collection of forms of the lady-fern, representing many variations, will be found here also. Some of the aquatic representatives of the ferns and their allies will be found in the pond nearby.

In this pond will also be found the following aquatic endogenous families: the cat-tail family, the bur-reed family, the pond-weed family, the arrow-grass family, and the tape-grass

family. At the junction of the brook with this pond is the water-plantain family, including, besides the water-plantain, several species of arrow-head (*Sagittaria*). A little beyond, in the brook, will be found the water-poppy family, represented by the water-poppy, a showy plant common in tropical regions.

Following to the north comes the large group of the grasses and grass-like plants, those whose flowers, mostly very small, are subtended by chaffy scales or glumes. This is represented by the grasses and the sedges, several beds being devoted to each of these families. Some of the more familiar grasses are: timothy, Kentucky blue-grass, reed canary-grass, orchard grass, red-top, and tall fescue-grass, all used in making hay. Other grasses of interest are: sweet vernal-grass, exhaling a pleasant odor when bruised; Job's tears, the ivory-like fruits of which are often used for beads in tropical regions, where it is common; the Japanese plume-grass, in several forms, very ornamental; the ribbon-grass, a variegated form of the reed canary-grass, and also ornamental; and species of many other genera.

The sedges are represented mainly by the large genus *Carex*, perhaps the most striking of which is Fraser's sedge, from the southeastern United States, at one time one of the rarest of plants, but rediscovered in recent years in large quantities in the mountains of North Carolina. The tussock sedge, common in our swamps in early spring, the cat-tail sedge, Gray's sedge, and the fox sedge, are others belonging to this genus. There are also representatives of bullrushes and other sedges.

Following the sedges is the arum family, having as representative plants, familiar to many, the skunk cabbage, the green arrow-arum, the green dragon, the jack-in-the-pulpit, and the sweet flag. In the brook opposite to this family will be found the somewhat related duckweed family; the duckweeds (*Lemna*) are very common, these tiny plants sometimes occurring in such numbers as to cover the surface of ponds and slowly moving streams. Along the edge of the brook

just beyond is the yellow-eyed grass family, and near it the pipewort family. Coming now to the spiderwort family, we have represented mainly the spiderworts and day-flowers. Among the former are the spiderwort, the mountain spiderwort, and the reflexed spiderwort; in the latter is the common day-flower. In a small pool and along its eastern edge is placed the pickerel-weed family. Here will be found a large clump of the pickerel-weed (*Pontederia*) which is so common in swamps and along streams in the vicinity of New York; here will also be found the water-hyacinth, which has become such a pest in some of the rivers of Florida and the West Indies, and the closely related blue water-hyacinth, of more straggling habit, also of tropical origin.

The rush family occurs next in the sequence, represented, among others, by such familiar plants as the common bog-rush, the slender rush, and the common wood-rush. Following this come the members of the bunch-flower family, with several species of bellworts, the turkey-beard, the Japanese toad-lily, the fly poison, the swamp pink, and others. Closely related to this is the lily family. One of the beds given over to this family is devoted to the true lilies (*Lilium*) in several forms; another is set aside for the onions and their relatives, of which there are many interesting forms, some of them of decorative value; while another bed is given to a miscellaneous collection of plants belonging to this family, among which may be mentioned the day or plantain lilies, the yellow day lilies and the lemon lilies, the true asphodel or king's sword, the grape-hyacinth, and Adam's needle. Other close relatives of the lilies belong to the lily-of-the-valley family; here will be found many familiar plants, among them being the lily-of-the-valley (*Convallaria*), the wild spikenard, the common asparagus, of such wide use as a vegetable in the early part of the summer, and several species of the Solomon's-seal, both from the Old World and the New.

The amaryllis family is shown by a number of species of daffodils and narcissus. In the iris family, which comes next, many species are represented. Most familiar among these

are: the common blue flag of our swamps, the yellow flag of Europe, the German iris, the Siberian iris, the Japanese iris, and the blackberry lily. For the canna family reference is made to the plantations at the Garden fountain at the approach to the museum building and to the conservatories, and for orchids to the conservatories.

Crossing the brook now by the path paralleling the driveway, we come to the beginning of the sequence of the large series of plants with net-veined leaves and with two seed-leaves (dicotyledons). This series begins with the lizard's-tail family, represented here in the brook by the lizard's-tail (*Saururus*), a common plant of our brooks and river borders in the eastern United States. To the nettle family one bed is at present given, located near the group of magnolia trees, where will be found, among other kinds: the slender nettle, of North America; the stinging nettle, native in Europe and Asia, but introduced into this country; and the wood nettle, also a North American plant; all of these secrete an oil through the hairs covering the stem and leaves, this oil being irritating to the skin, especially in the stinging nettle. In the immediate neighborhood and to the right is the birthwort family, represented by several species of wild ginger (*Asarum*), among them the common one of this region, the short-lobed wild ginger, the root of which is of medicinal value; another is Shuttleworth's wild ginger, of the southeastern United States. To the buckwheat family there are at present devoted three beds, forming a group to the left of the nettle family. The docks (*Rumex*) are present in many forms, as are the knotweeds (*Polygonum*); the most showy of these are the Japanese and Sakhalin knotweeds, the latter a plant of considerable economic importance, being used as a fodder plant, and is a native of the Sakhalin island; to this family also belong rhubarb, or pie-plant, and buckwheat. Next to this and near the brook is the goosefoot family, with several species, one of which, the lamb's-quarters (*Chenopodium*), is native of Europe and Asia, but found as a common weed in waste places and along roadsides in this country; its

young shoots are sometimes used as a vegetable. Closely related to this, and just south of it, is the amaranth family, represented by several species of the pigweed, many of them among the commonest weeds of our roadsides and waste places. Forming a series to the right of this are: the four-o'clock, pokeweed, carpetweed, and purslane families. In the four-o'clock family will be found the common four-o'clock of our gardens, a native of tropical America, its flowers opening only on cloudy days or late in the afternoon on clear days, whence its name; and the umbrellaworts, from North America. The pokeweed family is represented by the common poke or garget (*Phytolacca*), native of the eastern part of North America, a plant of medicinal value and poisonous, but its young shoots when first appearing above the ground are sometimes used as "greens." In the carpetweed family are the carpetweed, from which the family derives its name, a native of the United States and Mexico, but a common weed in this vicinity; and representatives of the south African fig-marigolds (*Mesembryanthemum*), many of them very showy; they are not hardy in this latitude and must be planted out every spring. In the purslane family, among others, will be found the sunplant or common portulaca of the gardens, a native of South America; the small-flowered talinum, from the central United States; and the common purslane or pusly, a pernicious weed in many sections of the country, and often used for "greens" or as a salad.

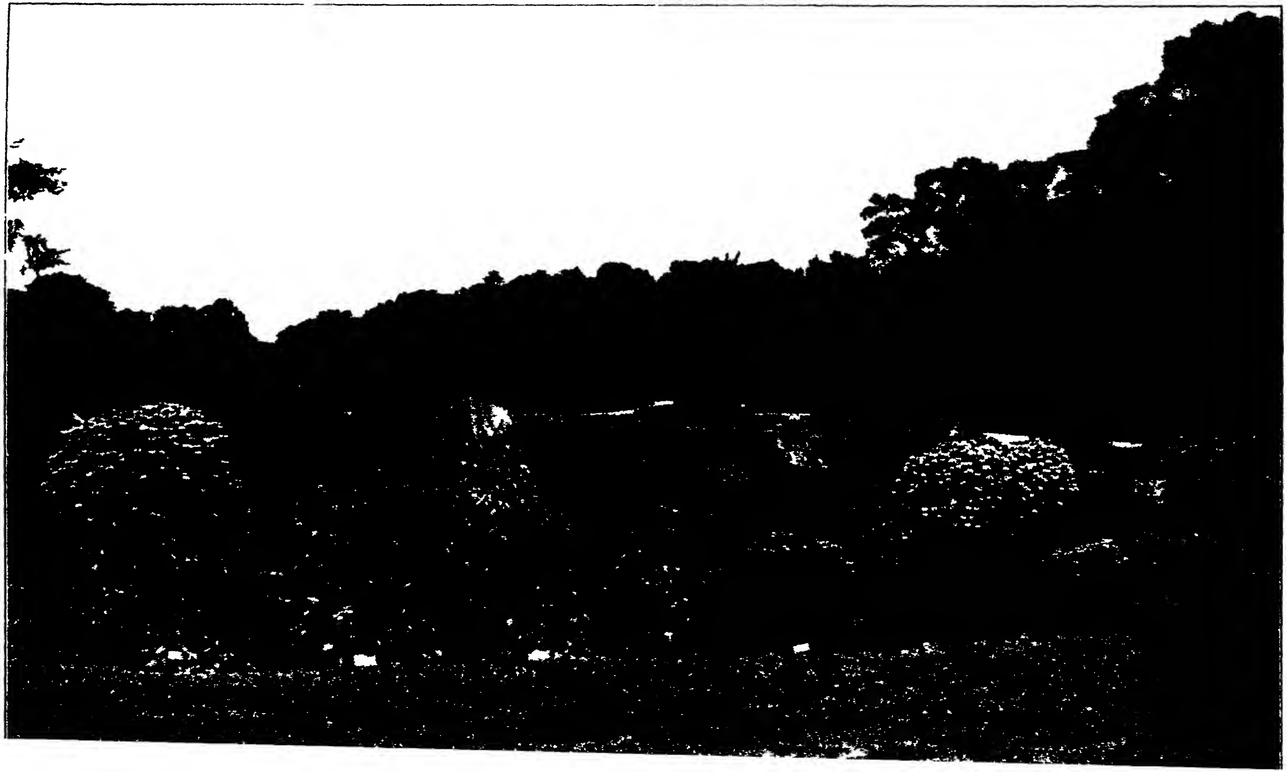
The pink family follows, with three beds. Many kinds of pinks, catchflies, chickweeds, and gypsophils will be found here. In the first pool, formed by the widening of the brook, is the water-lily family; the large yellow pond lily or spatter-dock, a native of eastern North America, will be found here, as will also its relative, the red-disked pond lily, from north-eastern North America; the small white water-lily, a native of northwestern North America and Asia, the European water-lily, from Europe and Siberia, and the sweet-scented water-lily, and its variety, the pink, or Cape Cod, water-lily, also find a place here; the water-shield or water-target is also a

member of this family and a native of North America. The tanks in the court of the public conservatories contain a great many additional kinds. The hornwort family likewise occupies a position in this pool. The aquatic members of the crowfoot family are grown here, the terrestrial forms being placed in four beds to the westward; one of these beds is given up entirely to the peonies (*Paeonia*), of which there are a number of interesting and handsome forms, and in the other beds will be found larkspurs, columbines, buttercups, meadow-rues, anemones, liver-leaf, and many other relatives; aconite, or monkshood, of great medicinal value, also belongs to this family.

The barberry family, which is represented by a single bed on the ridge to the right of the crowfoot family, contains, among others, the blue cohosh, and the may-apple or mandrake (*Podophyllum*), natives of North America; the twinleaf, a native of the northeastern United States; and the Japanese plants, the two-leaved aceranthes and the red epimedium. In the poppy family will be found the oriental poppy, a native of Asia Minor and Persia, and here may be seen also the cordate bocconia, from Japan, and the Mexican poppy, a native of Mexico and found as a weed in many tropical and warm temperate regions. In the fumitory family are the bleeding-hearts (*Bicuculla*), represented by the wild bleeding-heart from the eastern United States. The mustard family, which comes next in the sequence, occupies two beds. To this family belong the candy-tufts, represented here by the evergreen candy-tuft, from southern Europe and Asia Minor, and the alpine rock-cress, from Europe and North America, one of the showiest flowers in early spring, its mantle of pure white flowers making it a conspicuous object; there are many other species represented in this group. The caper family has as representatives the showy pedicellaria, a native of the Old World, and the clammy weed (*Polanisia*), from northern North America. The white and yellow cut-leaved mignonettes (*Reseda*) represent the mignonette family. Across the path to the right, on the ridge and partly surrounding a rocky knoll, is the bed devoted to the orpine or

stonecrop family, where there will be found many of the stonecrops (*Sedum*), among the more showy and attractive being: the great purple stonecrop, the great stonecrop, the white stonecrop, and the mossy stonecrop, all natives of Europe and northern Asia; the wild stonecrop and Nevius' stonecrop, both from our own country; the Siberian stonecrop and the poplar-leaved stonecrop, both from Siberia; and a Japanese species, Siebold's stonecrop; also belonging to this family are the houseleeks (*Sempervivum*), of which there are many representatives, all from the Old World, however, as these plants are not indigenous to the New World. Many other species of this family, not hardy in this latitude, will be found in the conservatories. Across the path from the orpine family will be found the three beds devoted to the saxifrage family. The heart-leaved saxifrage, with its large thick leaves, from Siberia, is one of the showiest plants here, sending up its large masses of pink flowers early in the spring, so early sometimes that they are nipped by the frost. Among other plants here may be mentioned: the alum-root, from the eastern United States; the two-leaved bishop's-cap, from the northern United States; the Japanese plant, *Rodgersia*; and the shield-leaf saxifrage, from the western United States. Menzies' saxifrage, from western North America, is interesting from the fact that in late summer and fall it produces small plants at the base of the leaf-blades.

To the herbaceous members of the rose family are allotted five beds, located to the left of the saxifrage family. Many species of cinquefoils and agrimonies will be found here; of the strawberry (*Fragaria*) there are several species represented; the lady's-mantle, from north temperate regions, the various species of avens, the goat's-beard, the burnets, and many others, are of decorative value or of interest for other reasons. The roses, blackberries and raspberries, also members of this family, are shrubs, and will be found at the fruticetum. The mimosa family has relatively but few representatives in temperate regions, most of its numerous members being confined to warm temperate regions and to the



tropics; the Illinois acuan is one of the plants representing this family here, and many others will be found in the conservatories. To the senna family belong the sennas or cassias, a showy representative being the American senna, a native of North America; this family being also largely of warm temperate and tropical distribution, many other species will be found at the conservatories. To the right of the mimosa family will be found the bed devoted to the pea family; to this some of our most valued economic plants belong, such as the pea, the bean, and the clover; to the pea family belong also the baptisias, the bush-clovers, the vetches, the tick-trefoils, and many other familiar plants.

Next in the order of sequence is the geranium family, to which belong the geraniums or crane's-bills; the plants so often cultivated in the house under the name of geraniums, but which are not hardy out of doors in our climate, are really not what they are called, but are truly pelargoniums, a closely-related group of plants belonging to the same family; besides our common wild geranium or crane's-bill will be found, among others, plants of the following: the knotted crane's-bill, from southern Europe; the Armenian crane's-bill, from Armenia; and the crimson crane's bill, from Europe and western Asia. A little farther on, near the brook, will be found the bed devoted to the wood-sorrel family, often called sour-grass by children; several species are shown here. Just to the left of the geranium family is the flax family, to which belongs the flax plant (*Linum*), from the fiber contained in the stem of which linen is made. Beyond this is the bed for the rue family; to this belongs the common rue, of southern Europe, and the fraxinella; this family also includes the oranges and lemons, specimens of which will be found at the conservatories, and a very great number of tropical trees and shrubs. To the right of this is a small bed devoted to the milkwort family. The spurge family is in a bed just to the left of the flax family; the flowering spurge, from the eastern United States, and the cypress spurge, from Europe, but sometimes found wild in this country as an escaped plant,

are both here. Along the edge of the brook, and opposite the spurge family, will be seen the water-starwort family, to which belong a number of small aquatic plants. About opposite this, and at the base of the rocky ridge to the right, are two representatives of the box family, in the trailing pachysandra, from North America, and its Japanese relative, the terminal pachysandra; the true box (*Buxus*) is a shrub or small tree, native of Europe, and several specimens of it will be found at the fruticetum. A little to the right of the wood-sorrel family is the jewel-weed family, to which belong the common balsam of the gardens, and the plant so common along our brooks and other wet places, and known as jewel-weed, or touch-me-not. A little beyond this are three beds of the mallow family; the hollyhocks belong here, as do the mallows; the crimson-eye mallow, and the swamp-rose mallow, both from North America, are showy representatives of this family; the halberd-leaved rose-mallow, also a North American plant, with its pinkish white flowers with a deeper center, is also showy; and the marsh mallow, a native of Europe and the Orient, is also shown; its root is used in the manufacture of a mucilage and for medicinal purposes.

To the right of the mallows is the bed given over to the St. John's-wort family. The rock-rose family comes next, a little further on; here belong the rock-roses of Europe, and our own frost-weeds. To the right of this is the violet family; a large collection of our native species, together with some from foreign lands, is here brought together and many of these will be recognized as old friends. Up on the ridge to the right, across the walk, will be found the cactus family; relatively few of these are hardy in this climate, so the larger part of the cactus collection must be sought in the conservatories. Here will be found, however, several representatives of the prickly pears (*Opuntia*), including the eastern prickly pear, common in this part of the country, which is frequently found on the rocky ridges in the vicinity of New York and occurs wild on some ledges within the Garden reservation. Down near the brook, and not far from the mallow family,

is the loosestrife family, represented by the purple loosestrife, a native of Europe, but introduced in many places in this country; among others belonging to this family is the swamp loosestrife or willow-herb (*Decodon*), a plant of which will be found along the brook opposite to the loosestrife bed. Near this, on the edge of the brook, is located the meadow beauty, one of the prettiest little flowers of our meadows. It belongs to the meadow-beauty family, few species of which occur in cool regions; it is largely represented in warm temperate and tropical regions, and many other species will be found in the conservatories. But a short distance from the violet family is the evening-primrose family; here will be found a number of the evening primroses (*Oenothera*), with their showy yellow flowers, noteworthy as the plants mainly experimented with by Professors DeVries and MacDougal in their studies on the origin of species. Along the brook, not far from the loosestrife family, is the water-milfoil family, represented by the Chilean water-milfoil or parrot's-feather, forming a beautiful mass of feathery green on the surface of the water. Returning now to the ridge, a little beyond the violet family, we find the bed allotted to the ginseng family; here are the Indian-root, from eastern North America, and the heart-leaved aralia from Japan. To this family also belongs the ginseng plant, the root of which is so much prized by the Chinese as a medicine. Down the slope from this group will be found two beds given over to the carrot family, which includes many economic plants, such as the carrot, parsnip, celery, and caraway; lovage, a common European plant, is shown, and the rattlesnake-master, from the eastern United States; the wild carrot and the golden meadow parsnip also belong here.

To the primrose family, located at the base of the ridge a little beyond the carrot family, belong the primroses (*Primula*), many of which are natives of Europe; here we find the common European primrose, the cowslip, and others; the moneywort, a native of Europe, but introduced into many places in this country, sends its long creeping stems all over the bed—

this is sometimes known as creeping Charlie; the fringed loosestrife, from North America, is also here, as is the clethra-like loosestrife, from Japan, with its racemes of white flowers. Between the two beds devoted to the carrot family, and a little beyond, is the plumbago family, to which belongs the common thrift of Europe; there are several other thrifts here also, as well as the statices or sea-lavenders, in several species. The bed allotted to the gentian family is to be found a little beyond the plumbago family; various gentians are represented, among them the blind gentian, a native of the United States, and the Thibet gentian, from the Himalayas and China. In the brook, just beyond the little stone bridge, will be found the buckbean family; here are shown the water-snowflake, common in tropical regions, and the water-lily floating heart, native in Europe and northern Asia.

Just beyond the left hand bed devoted to the carrot family is the dogbane family; the willow-leaved amsonia, from the central and southeastern United States, and the broad-leaved amsonia, from the central and eastern United States, are conspicuous objects here. Beyond this are two beds of the milkweed family and among its representatives are the common milkweed of our roadsides, the hairy milkweed, and the swamp milkweed; the swallowworts also belong here and are illustrated by several species. In the morning-glory family, located to the right of the above, are the small bindweed, of northern Europe and Asia, sometimes a troublesome weed in this country, and the bush morning-glory from the western United States. Following the milkweeds is the phlox family; interesting plants here are the Jacob's-ladder (*Polemonium*), of Europe, with its masses of blue flowers; the hairy phlox, of North America; Britton's phlox, a relative of the common ground phlox, from the southeastern United States; the ground phlox and its white-flowered form, both natives of the eastern United States; and forms of the garden phlox, also from the southeastern United States. In the shade, the natural habitat of many of these

plants, is the water-leaf family, at the base of a large rock on the ridge; there are the purple, the broad-leaved, and the Virginia water-leaf (*Hydrophyllum*).

Further along and at the base of the ridge is the borage family; the tuberous comfrey, the rough comfrey, and the common comfrey, all natives of Europe, are represented; the common alkanet, of Europe, and the showy landolfia, from the Himalayan region, are also shown. In the vervain family, in a small bed to the left, will be found: the wedge-leaved fog-fruit (*Lippia*), from the western United States and Mexico; the blue vervain, from the eastern United States; and the white, or nettle-leaved, vervain, a native of eastern North America. We now come in the sequence to the mint family, to which are devoted six beds; among the true mints will be found here the creeping whorled mint, the curled mint, and the spearmint all from the Old World. Many familiar plants will be seen in these beds, and among them are: the false dragon-head, of the United States; motherwort, common in Europe, and widely distributed as a weed in this country along roadsides and in waste places; the horse-balm, of North America, common in the east in woods; Oswego tea, and other bergamots, natives of North America; the betony and hyssop, of Europe; the hedge-nettles, from both the Old World and the New; the common sage of the Mediterranean region, highly prized by the housewife, and other sages; catnip, a native of Europe, but widely distributed as a weed in this country; Gill-over-the-ground, or ground ivy, also a European plant, but extensively spread as a weed in this country; and the dittany, of North America.

The potato family will be found a little to the left and just beyond the phlox family. Here may be seen the common jimson, or Jamestown, weed, the seeds of which are poisonous, a native of tropical regions, but a common weed along our roadsides; the nightshade, a European plant, but commonly distributed as an introduction in many parts of this country, also with poisonous fruit; tobacco plants, and sola-

nums; it is to this family that the potato, tomato and egg-plant belong. A little beyond and to the left of the mints are the two beds allotted to the figwort family; of interest here are: the beard-tongues, of which there are several species; the speedwells (*Veronica*), among them the long-leaved speedwell and the gentian speedwell; the fox-gloves (*Digitalis*), from one of which, the purple fox-glove, the valuable medicine digitalin is derived; Lyon's snake-head from the southern states; culver's-root, from the southeastern United States; and several figworts. Just beyond this will be found the unicorn-plant family, represented by the yellow unicorn-plant, a native of Brazil. A little beyond is the globularia family, represented by a single species of globularia. To the right is the acanthus family; not many of these plants are hardy in this latitude, but at the conservatories many representatives will be found, as the family is largely confined to tropical and warm temperate areas; in this bed will be seen the hairy ruellia, from the southeastern United States, and the long-leaved acanthus, a native of southern Europe. In this neighborhood may also be seen the lopseed family, represented by the lopseed, a native of eastern North America.

To the right of the acanthus family is the single bed devoted to the plantain family; several species, such as Rugel's plantain and rib-grass, are pernicious weeds in this neighborhood, often disfiguring an otherwise even lawn. Just beyond the mints will be found the two beds of the madder family; to this belongs the dainty little bluets or innocence, which sometimes gives a blue sheen to sterile, sandy places, so abundant is it in some localities; it is quite common in eastern North America; several species of bedstraw (*Galium*) will also be found here, while many other plants belonging to this family are grown at the conservatories, among them the coffee tree. A little beyond is the single bed of the honeysuckle family, represented by the feverwort and the narrow-leaved feverwort; this family being largely composed of woody plants, many other species, including the true

honeysuckles, will be found in the fruticetum and in the viticetum. To the left is the valerian family with a single bed; here will be found the valerian, a common European plant.

Just beyond the plantain family is the teasel family. It is to this that the teasel plant belongs, used in olden times for raising the nap on woolen cloth. Several species of cephalaria will be found here. The bell-flower family is a little further on and to the left; the Carpathian and Host's bell-flowers, both natives of Europe, are pretty representatives here; the creeping bell-flower, or Canterbury bells, also a native of Europe, will be found here in several forms; the Japanese bell-flower, and its white variety, are also here, their large showy flowers making them quite conspicuous. A little further on and to the left is the lobelia family; the cardinal flower and the blue cardinal flower, both natives of North America, make showy objects; the former is particularly striking in its rich masses of cardinal-red flowers.

To the right of the teasel family is the chicory family. The common lettuce (*Lactuca*), so much used in salads, belongs here; many of the plants are extremely weedy by nature, and this is particularly true of the hawkweeds, a genus richly represented in the Old World, several species of which are shown here; the oyster plant is also a member of this family.

To the left of this will be found the ragweed family. All the species here are of a weedy nature. The ragweed, the giant ragweed, and the common clot-blur find representation here. Terminating the sequence comes the very large thistle family, represented by many species from all parts of the world; there are nine beds at present given over to these plants; the sunflowers, coneflowers, thistles, asters, fleabanes, yarrows, golden-rods, tansies, sneezeweeds, burdocks, artemisias and wormwoods, cat's-foot, tick-seeds, elecampane, boneset, chrysanthemums, colt's-foot and many others are shown; the Jerusalem artichoke, one of the sun-flowers, a native of eastern North America, bears edible tubers.

(*b*) Morphological Garden

This is located to the north of the systematic collection, the two collections being separated by the driveway which crosses the valley. It is designed to illustrate here with typical examples the organs and other features of plants, including leaf-forms and the various modifications of their margins, their venation, and insertion on the stem; also the various kinds of stems, methods of propagation, flower-clusters and fruits, leaf-movements, parasites, desert plants, and seed-dispersal. Looking north on this collection, the first bed to the right of the brook contains plants illustrating simple leaf-forms. Immediately following this on the same side of the brook are the plants representing the various forms of compound leaves, or those in which there is a distinct jointing of the leaflets to the leaf-axis. Farther along the brook, in the pool, will be found various forms of aquatic roots, stems and leaves; and a little beyond this to the right is the bed containing plants illustrating forms of propagation.

The remaining plots of this collection are located on the left hand or westerly side of the brook. The first of these to the right is devoted to leaf-venation, and the one to the left to leaf-margins, the former illustrating the character of the veins and nerves, and the latter the toothing or lobing of the margins. Beyond this to the right is the group of plants showing the manner of insertion of the leaves on the stem; and to the left of this are specimens illustrating the various ways in which plants may form a mosaic covering on the ground. A little beyond are the examples of stem-forms. One bed is devoted to show the smaller kinds, while for the larger examples, illustrating tree, twining, root-climbing, and tendril-climbing stems, specimens have been selected or placed to the left of this bed and properly labeled.

A little beyond the pool will be found the bed illustrating flower-clusters, and still further on that devoted to parasitic plants, or those deriving their nourishment from the living tissues of other plants. To the left of this and farther up the

hill is the group of plants showing leaf-positions. Beyond and a little to the right are plants which are at home in desert regions, and the various means of accommodating themselves to their natural surroundings are shown. Further on to the right is the bed devoted to fruit-forms; and to the left of this, one showing various forms of seed-dispersal; those with the surface of the fruits covered with some sticky substance or curved appendages or hooked hairs or spines require the intervention of some animal for their distribution, while those with wings or with hairs attached to the seed are spread through the agency of the wind. To the right of the above are plants representing a species and a variety, and to the left of this is a bed containing plants showing species and hybrids.

(*c*) Economic Garden

The collections illustrating plants producing substances directly useful to man in the arts, sciences and industries are now being installed at the northern end of the long glade containing the herbaceous collections just described. They illustrate food-plants, fiber-plants, drug-plants, fodder-plants, and a variety of other economic species.

(*d*) Viticetum

The area devoted to the plantation of vines is at the easterly side of the economic garden. Hardy vines, whether woody or herbaceous, belong here, and a rough arbor has been constructed for them to climb on. This collection is now being developed, and only a few of the species which it is intended eventually to grow there are as yet in place. The families will be referred to below in the order of their sequence. The arrangement begins at the southerly end of the arbor, on the left hand side, with the smilax family, to which belong the green-briers or cat-briers. The yam family is placed immediately opposite to the right, followed by the mulberry family on the same side. The birthwort family, with the dutchman's-pipe as a representative, follows the smilax family on the left; and opposite to this is placed the

buckwheat family, to which belong the climbing bindweeds and brunnichia. On the left hand side, and beyond the birthwort family, is the akebia family, where one will find the five-leaved akebia, a native of Japan. Following this on the same side is the moonseed family, to which belongs the Canada moonseed. On the opposite side of the arbor is the hydrangea family. The next family, occupying both sides of the arbor, is the rose family, where will be found some climbing roses. Following this, also on both sides of the arbor, is the pea family, where one must seek the peas and wistarias. Further on, occupying both sides, is the staff-tree family, where will be found the climbing bitter-sweet and other vines of this family. Succeeding this comes the grape family, to which belong the grapes, the Virginia creeper, and the Japanese ivy. On the right, beyond the grape family, is the actinidia family, represented by the toothed actinidia. Opposite to this is the morning-glory family, where the morning-glories and moon-flower belong. Then comes the trumpet-creeper family, of which the trumpet-creeper, a native of the southeastern United States, is a member. This family in turn is followed by the honeysuckle family, represented here by several species of honeysuckle and woodbine. The sequence terminates with the gourd family, to which belong, as economic plants, the watermelon, cucumber, squash, muskmelon, and gourds; a common vine of eastern North America, and frequent in the valley of the Bronx, is the one-seeded bur-cucumber, or star-cucumber, also a member of this family.

5. The Fruticetum

[Collection of shrubs]

This plantation, occupying about 16 acres, is located to the northward of the lakes in the rear of the museum building, and is confined to the area lying between the lakes, the railroad, the woodland on the east, and the north meadow. In this collection are brought together all the hardy woody plants which are shrubs, that is plants with woody stems which branch from the ground and have no single main stem.

The arrangement here parallels that in the herbaceous grounds and in the other systematic collections. The sequence begins on the southerly side near the large stone bridge which crosses the Bronx River, and proceeds on both sides of the path running to the north along the edge of the woods, returning southward on both sides of the path paralleling the main north and south driveway, to the plum family, on the bank overlooking the easterly lake. It then crosses to the senna family directly opposite and overlooking the westerly lake, proceeding northward from there across the transverse driveway, and following the line of the path paralleling to the westward the main north and south driveway. The sequence then continues to the westward along the north path, again extending southward at the Woodlawn Road entrance, continuing on both sides of the westerly path and terminating with the thistle family at the westerly end of the lake near the railroad border. The families will be referred to below in this sequence.

The first is the willow family, beginning near the entrance to the stone bridge across the Bronx River; this group is located on both sides of the path and comprises many forms from various parts of the world; the family is largely an inhabitant of temperate regions, so many species can be grown here. The bayberry family occurs across the driveway from the willows, occupying a position on the bank overlooking the easterly lake. Here will be found the sweetfern, a native of eastern North America; the sweet gale, at home in north temperate regions; and the waxberry or bayberry, common in eastern North America; the berries of the latter have a covering of wax, which was obtained by throwing the berries into hot water, when the wax melted and rose to the surface, where it was skimmed off; it is still used to some extent in making candles. The birch family follows the willows on the east side of the path; here are the hazelnuts, the alders, and the shrubby birches; the common hazelnut and the beaked hazel-nut, both from North America, also the common hazel-nut or filbert of Europe, and others; the

smooth alder, common along streams and in swamps, is also here. Following the birch family on the same side of the path comes the beech family; here will be found the shrubby oaks, and the chinquapin of the southeastern United States. On the same side of the path a little farther along is the elm family, represented by the dwarf elms; most of the members of this family are trees and will be found therefore in the arboretum. Immediately following this is the mulberry family, represented here by two specimens of the Tartarian mulberry. At the triangle a little further on is the cercis-leaf family, represented by the cercis-leaf (*Cercidiphyllum*), a Japanese tree, and known to the people there as katzoura; there are three specimens of this, most attractive in the spring with their tender greens flushed with rose.

The crowfoot family occupies a space just to the north of the willows west of the path, and is represented by the moutan or tree peony, from China, and the shrub yellow-root (*Xanthorrhiza*), from the eastern United States; its roots are yellow, and at one time were employed as a dye; there are many herbaceous members of this family at the herbaceous grounds. The barberry family is a little farther north on the same side of the path; many species of barberries and mahonias occur here. Among the barberries may be mentioned: the common European barberry, the ripe fruit of which is sometimes made into preserves, and the unripe ones pickled as a substitute for capers — its bark is used as a dye and for tanning leather; Thunberg's barberry, from Japan, a desirable plant for small hedges and for the borders of walks; the neat barberry, from the Himalayan region, which colors a beautiful red in the fall; and the large-toothed barberry, from Nepal; the mahonias are represented by the erect Oregon grape, from northwestern North America; and the Japanese mahonia. The magnolia family occurs a little back from the path, between the crowfoot and barberry families; there are here several species of shrubby magnolias. The strawberry-shrub family follows the barberries, immediately across the path from the cercis-leaf family; here will

be found several species of the strawberry-shrub, including the hairy one which has the fragrant flowers scented like the strawberry; the fragrant *Chimonanthus*, from Japan, is a member of this family, and is known to the natives there as karamume. A short distance to the eastward of the cercis-leaf family is the laurel family, represented by the spice-bush (*Benzoin*), a native of northeastern North America; as the different kinds of flowers, staminate and pistillate, are borne on different plants, only those having pistillate flowers bear the bright red berries in the summer and autumn. To the west of this is the Virginia willow family, with shrubs of the Virginia willow, a native of the southeastern United States. To the north of this is the hydrangea family; here will be found the syringas, the deutzias, and the hydrangeas, several species of each; the mock orange (*Philadelphus*), a native of Europe, indicates its presence by the rich fragrance of its flowers: the slender deutzia, from Japan, bears its long slender clusters of white flowers in great profusion; the large-flowered hydrangea, a Japanese plant, bears a profusion of large bunches of white flowers, which in the late summer and autumn change to a beautiful rose color; the oak-leaved hydrangea is perhaps the oddest member of this genus; it is native from Georgia and Florida to Mississippi. Following the hydrangea family comes the gooseberry family, and to this belong the currants and gooseberries; one of the showiest is the long-flowered golden currant, from western North America; its rich yellow flowers give forth a delicious spicy fragrance. The witch-hazel family is located to the north of the uncompleted north path; here is the common witch-hazel, of eastern North America, from which the extract of witch-hazel, or Pond's extract, is made; the spiked corylopsis, a Japanese shrub, belongs here, as do the fothergillas of the southeastern United States.

The rose family occupies a large area, beginning just north of the gooseberries and currants and extending westward to the main north and south driveway, and southward along that as far as the first transverse path; here belong the

spiraeas, of which there are many forms, the blackberries, the raspberries, the roses, and others. Among the spiraeas, the steeple-bush or hard-hack and the willow-leaved meadow-sweet or quaker-lady are common as wild plants in this latitude. Other interesting forms are Thunberg's spiraea, from Japan, and other Japanese spiraeas. Among other plants of interest in the group which contains the spiraeas are the large-flowered exochorda, a native of northern China, with its profusion of white flowers in early summer; the Japanese rose, from Japan, not a true rose however, with bright yellow flowers; another shrub from Japan, known to the natives of that country as siro yama buki, bears large white flowers resembling in appearance those of the mock orange; two other Japanese shrubs, members of the same genus, and known to the natives there as kago ma utsugi and yama doosin respectively, the former an exceptionally graceful and attractive plant; *Neviusia*, an extremely local plant, known in a wild state only in Alabama; and the nine-bark, of eastern North America. To the southward of the spiraea group comes the collection of blackberries and raspberries (*Rubus*), represented by many kinds; two of the showiest are the Japanese wine-berry, and the purple flowering-raspberry, the latter common in rocky woods in this part of the country. Farther to the south, and bordering both sides of the transverse path, is the group of the true roses; many kinds will be found here, including the sweet-brier, the dog-rose or wild brier, and the red-leaved rose, all natives of Europe; the low or pasture rose of eastern North America; and the odd-looking Watson's rose, a native of Japan. Numerous herbaceous species of the rose family are grown at the herbaceous grounds.

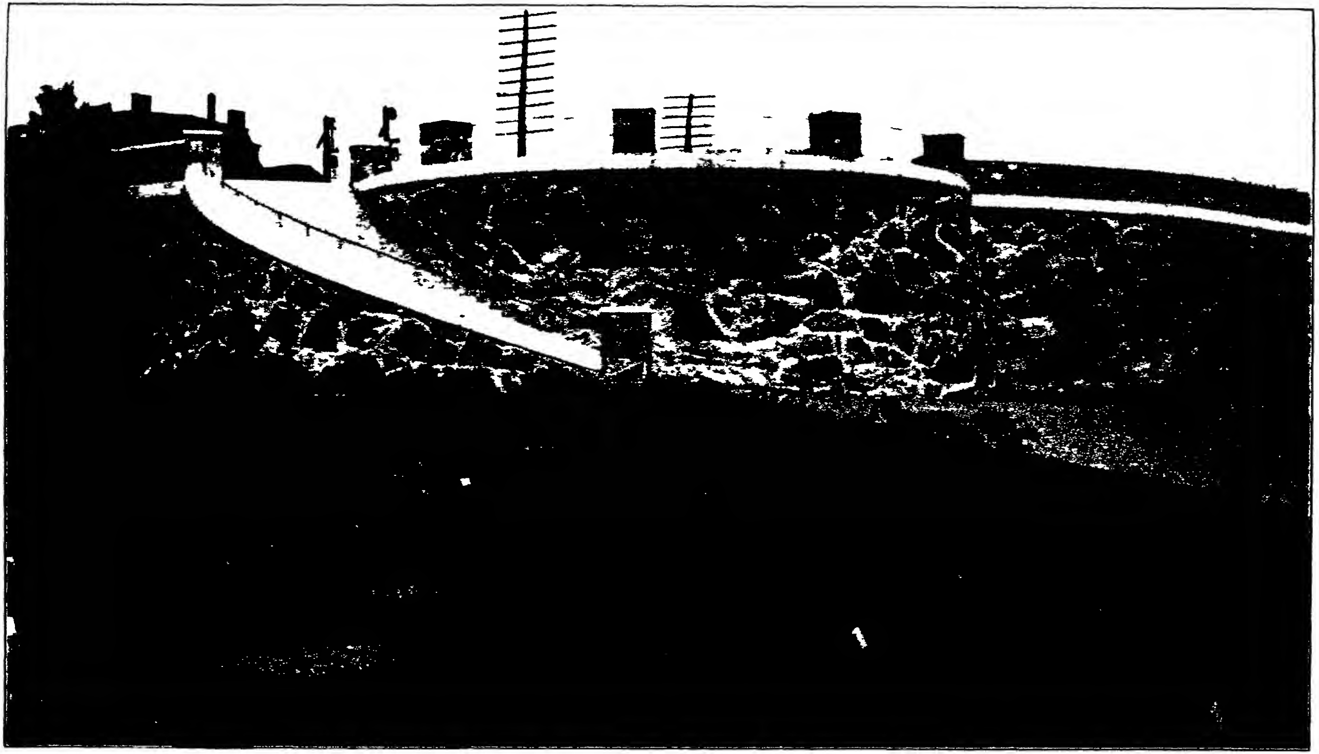
Following this is the apple family; to this belong the apples and pears, many of which, being trees, will be found in the arboretum. Of a shrubby habit, and so members of this collection, are many of the hawthorns or thorn-apples, the quinces, the rose-boxes, the choke-berries, the service-berry and the shad-bush. Southward across the driveway from these, and overlooking the easterly lake, is the collection

illustrating the plum family, to which belong the plums, cherries, apricots, and peaches. As many of the species of this family are trees they will be found at the arboretum. Among those represented here are the western sand cherry, of northwestern North America; the three-lobed peach, a native of China, with its double-flowered form; the dwarf peach, from Europe; and the Russian almond, of Russia and western Asia.

Crossing the driveway to the west, the sequence is again taken up on the ground overlooking the west lake, with the senna family, represented by the Asiatic Judas-tree, of China and Japan, and the American Judas-tree of the eastern United States; in spring, before the appearance of the leaves, these are profusely covered with pink or purplish flowers. Across the transverse driveway to the north, and directly on the opposite side, will be found the pea family. Here are various species of the pea-tree: the pigmy pea-tree, from the Himalayan region; the Chamlagu pea-tree, from China; the common pea-tree and the small-leaved pea-tree, both from Siberia. In the fall the two-colored bush-clover, from China, is a show of purple bloom. The white broom, the common broom, and the dense-flowered broom, all of Europe, have representatives here; of these, the common broom, in Spain and France attains the size of a small tree, and its wood is highly prized for veneering and cabinet work; its branches are extensively employed for making brooms, whence its common name. Other plants of interest are the false indigo and the bristly locust, both from the southeastern United States; the woody bladder-senna, from Europe and the Orient; and the scorpion senna, from southern Europe. Immediately beyond is the rue family, illustrated by the shrubby trefoil (*Ptelea trifoliata*) of the eastern United States; the prickly ash, from the northeastern United States; and the trifoliolate orange, from Japan, which has been used as one of the parents in the recent hybridization experiments by the U. S. Department of Agriculture in its effort to produce a more hardy orange; the lemon and forms of the orange will be found at the conservatories,

together with other woody members of this family. The tanners'-tree family comes next with a single representative, the tanners'-tree, from the Mediterranean region. Following this is the box family, represented by a number of forms of the box-tree, from Europe, Asia and Japan; the wood of the box-tree is highly prized for wood-engraving, on account of its hardness and close fine grain, and it takes a fine polish. A few steps further on is the sumac family, to which belongs the common poison ivy, so frequent in and around New York City; here are the fragrant sumac, the mountain sumac, and the smooth or scarlet sumac, all from the eastern United States; Osbeck's sumac is a stately shrub from China. The European and the American smoke-trees (*Cotinus*) are relatives of the sumacs; the former is sometimes called the wig-tree, on account of the flower-clusters which become white and feathery in fruit; a dye is obtained from it which is called young fustic.

Crossing the transverse path to the triangle, we find the holly family on the nearest point, shown by the serrate holly and the crenate holly, both from Japan; the European holly is grown in the conservatories and the American holly at the arboretum. The Virginia winter-berry, of the eastern United States, bears its bright red berries far into the winter. On the opposite corner of the triangle is the staff-tree family, illustrated by many forms of *Euonymus*; the European staff-tree, the burning-bush of the eastern United States, the winged spindle-tree of eastern Asia, and Bunge's spindle-tree of the Amur region are shown. Crossing the path to the north of the triangle we come to the maple family; most of the maples are trees, so must be looked for in the arboretum, but here are specimens of the Ginnala maple, from northern China and Japan. Immediately beyond this is the bladder-nut family, represented by species of the bladder-nut (*Staphylea*), both from the New and the Old World. Following the path to the west, we come to the buckeye family, represented here by the small-flowered buckeye, from the southeastern United States; many of the buckeyes and horse-



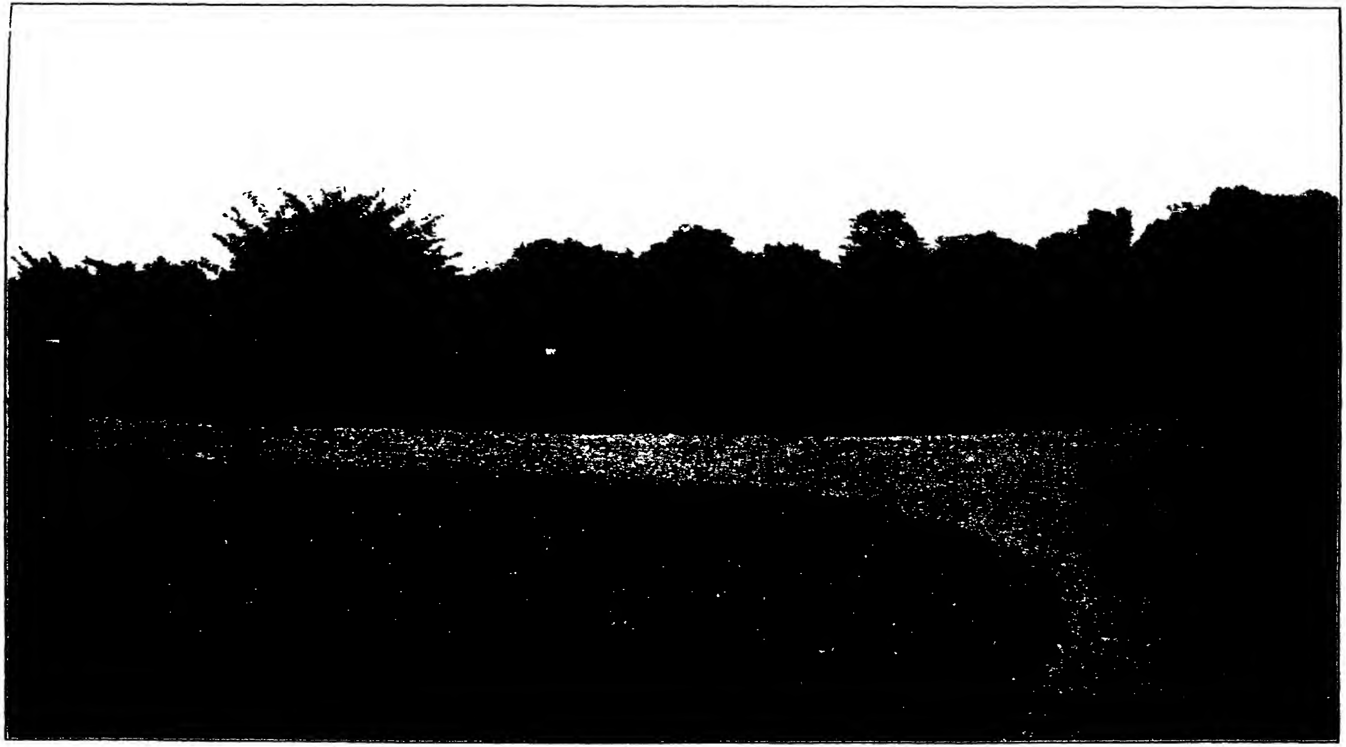
APPROACH TO THE WOODLAWN ROAD ENTRANCE

chestnuts are trees, and are grown in the arboretum. Following this is the soapberry family, with the soapberry, from the southeastern United States, as a representative. At some distance from the path to the left is the buckthorn family; the most familiar plant here is the New Jersey tea, or red root, of eastern North America; its leaves have been used as a substitute for tea, and it is said that the industry is being revived in Pennsylvania; the jujube-tree, an inhabitant of the Mediterranean region and temperate Asia, is of this family, its edible fruit oval in shape, and about the size of a plum, with an acid taste when fresh; the Dahurian buckthorn, growing wild from central Asia to the Amur region, and the purging buckthorn of Europe, the berries of which are medicinal, are here; from the juice of the ripe fresh berries of the purging buckthorn, mixed with alum, is made the pigment, known as sap-green or bladder green, used by water-color artists. The mallow family, further along the path, is represented by two specimens of the rose-of-Sharon (*Hibiscus syriacus*), from western Asia, and often found escaped from cultivation in the eastern United States; many herbaceous representatives of this family will be found at the herbaceous grounds. Near the mallow family is the tea family, represented by the mountain *Stuartia*, from the southeastern United States; other members of the tea family, including the tea plant and the common camellia, will be found at the conservatories. Also near the mallows will be found the St. John's-wort shrubs (*Hypericum*), with their showy yellow flowers. Farther on, where the path bends to the left, is the tamarix family, represented by several species of tamarix, Old World plants. Next comes the mezereon family, having as a representative the leather-wood or moose-wood (*Dirca*), of the eastern parts of North America; the name leather-wood refers to the very tough inner bark; the bark is a violent emetic.

Some distance from the path and opposite the Woodlawn Road entrance, is the oleaster family, including several species of oleaster, the buffalo berry, and the sea-buckthorn, a native

of Europe, the berries of which are acrid and poisonous; the berries of several of the species of oleaster are edible; the buffalo berry, of northwestern North America, is largely eaten by the Indians of that region; the berries of the oriental oleaster, known as Trebizond dates, are made into cakes by the Arabs, after having been dried. Plants of the ginseng family form a group opposite the same entrance, some of these being quite tropical in aspect; the Japanese angelica-tree, from Japan, is one of these, and another is Maximowicz's acanthopanax, also from Japan; the variegated Chinese angelica-tree, a native of China, is quite ornamental. Beyond this group, and on both sides of the transverse path, is the dogwood family, shown by many species of dogwood or cornel (*Cornus*), from both the Old World and the New; the red-osier dogwood, the kinnikinnik, and the panicled dogwood are American representatives; the officinal dogwood comes from Japan, and is known there as sandzaki; the dogberry, gater-tree, or hound's-tree, is from Europe and western Asia; its wood is hard, and is sometimes made into butchers' skewers and tooth-picks; in France, an oil used for burning and in soap-making, is extracted from the black berries.

Across the path from the dogwoods, at the foot of the steps, will be found the white-alder family. Here are the Japanese sweetpepper bush, and the North American sweetpepper bushes or white-alders, their fragrant white flowers appearing in August. The heath family is next, represented by many forms of azaleas and rhododendrons; the Japanese *Pieris* is a pretty plant, and another of the same genus, from the southeastern United States, is called stagger-bush. Following the path to the south, we come next to the huckleberries and to the shrubs of the storax family. On the other side of the path is the olive family, which covers a large area, extending along the path for a considerable distance; the olive-tree is the type of this family, and specimens may be found at the conservatories; in the fruticetum are several forms of the golden-bell (*Forsythia*), from China; a num-



VIEW IN THE FRUTICETUM, OR SHRUB COLLECTION

ber of the privets, including the California privet so much used for hedges; a variety of lilacs (*Syringa*), including the Rouen lilac, from China, the Pekin lilac, from southern China, the Himalayan lilac, and the common lilac, a native of eastern Europe, so frequently cultivated in gardens, and the adelias. To the right of the path and following the storax family is the logania family, with species of *Buddleia*, including the showy variable buddleia, from China. Following this is the vervain family, and some of these shrubs are especially attractive in fruit, among them being the purple callicarpa, from China, and the Japanese callicarpa; most attractive is the late-flowering clerodendron, a Chinese plant, whose flowers have a delicious spicy fragrance, much like that of the sweet-pepper bush; the sepals are a beautiful rose color, while the corolla is creamy white; it blooms late in the summer or early fall, when flowers of shrubs are few.

We next come to the potato family, shown here by the matrimony vine, a native of Europe, but often found growing wild, its purple flowers followed by bright red berries; most of the hardy representatives of this family are herbs, so must be sought for in the herbaceous grounds, while many of the woody species, and some of the herbs, are tender, and will be found at the conservatories. The succeeding group is the honeysuckle family, to which is allotted a large area, there being many hardy kinds; the viburnums are represented by many species, both from the Old World and the New, such as the cranberry-tree, from north temperate regions, ornamental by its masses of bright red fruit; the dwarf cranberry-tree, an exceedingly compact form, very dense in its growth; the Chinese viburnum, from China and Japan; Siebold's viburnum, from Japan; the Japanese snowball, from China and Japan; the wayfaring tree, from Europe and Asia; aad the woolly viburnum, from China and Japan; among American forms may be mentioned the arrow-wood, the coast arrow-wood, the black haw or sloe, the withe-rod, and the larger withe-rod with its large bunches of showy fruit. The group of the honeysuckles occupies a position across

the path from the viburnums, and here will be found, among others, the fragrant honeysuckle, from China, one of the first to send forth its blossoms richly laden with perfume; Morrow's honeysuckle, from Japan, covered with coral-red fruit in late summer and fall; Standish's honeysuckle, from China; the narrow-leaved Albert honeysuckle, from Turkestan; the blue fly-honeysuckle, from north temperate regions; and the golden-veined honeysuckle, from China and Japan, with the veins richly marked with yellow, or sometimes the whole leaf yellow. Across the transverse path to the south, and overlooking the lake, will be found the weigelas, symphoricarpos, and the diervillas; the weigelas are illustrated by many showy forms, flowering in early summer; the showiest *Symphoricarpos* is the snowberry, native of northern North America, laden in autumn with its ivory-white fruit, making it most attractive; the diervillas are represented by two or three species, including the bush honeysuckle, a native of northern North America. The elder-berries (*Sambucus*), are also represented by two or three species. The Chinese abelia will also be found here; its fragrant flowers are borne in great profusion during late summer and early fall; the sepals are deep red-brown and the corolla is white, flushed with rose, making a pleasing combination.

Following the viburnums comes the thistle family. Few of the woody species of this family are hardy in this latitude, but large numbers of the herbaceous species will be found at the herbaceous grounds. As representatives in the fruticetum, we have the groundsel-bush or pencil-tree (*Baccharis*), a native of the southeastern United States, bearing in the fall a profusion of white fruit, making it a most attractive object; and some of the shrubby wormwoods (*Artemisia*), of the Old World.

Salicetum. — The area occupied by this plantation is between the main driveway and the Bronx River, north of the fruticetum, and comprises several acres. Here are brought together moisture-loving willows (*Salix*) and poplars (*Popu-*

lus) as a collection apart, many species grown here not being represented in the arboretum and fruticetum. Immediately beyond the uncompleted north path at the fruticetum is a row of poplars, fringing the southerly end of the north meadow, consisting of several trees each of Simon's poplar, from China, and Wobst's poplar, a Russian species. In the corner of the salicetum, next to the driveway, is a group of willows consisting, in part, of the red-stemmed yellow willow, of horticultural origin, and the Ural purple willow. To the east of this will be found the golden, or yellow, willow, of common occurrence in eastern North America, and Bashford's willow, a native of France. Along the west bank of the Bronx River will be found a row of trees of the cottonwood, or Carolina poplar, found wild in eastern North America; and another row of the weeping willow, a native of Asia. At the northern end of the area devoted to this plantation are to be found, among others, the purple willow, a native of Europe; the black willow, of North America, and the pussy willow, a native of the northeastern United States. Many other species are represented in this collection.

6. The Deciduous Arboretum

This plantation extends over most of the garden area east of the Bronx River. The sequence of plant families begins at the southeast entrance to the grounds, and continues northward to the northern boundary, occupying the easterly ridge and the low grounds adjacent thereto. Here hardy trees are brought together, trees being regarded as woody plants which have a single main stem arising from the ground and not branching until some distance above it. This collection is only partially formed, but additions are made to it every season. The groups will be referred to in the order of their sequence.

The first is the willow family which occupies the low-lying land near the southeast entrance and the ridge to the north, where a collection of willows and poplars may be found. Of these Simon's poplar, from China, is of rapid growth and

upright habit, and more graceful than the cottonwood or Carolina poplar; the American aspen, a native of northern North America, the wood of which is largely manufactured into pulp for the making of paper; in northern British America it is the principal fuel of the Indians, as it burns freely when green and without sparks; the inner bark, which is sweet, is often used by them as a food in early spring. This tree has been of great service in re-foresting large tracts which have been denuded by fire; the long hairy appendages to the seeds enable the wind to carry them far and wide, and as they germinate quickly and the young seedlings grow rapidly in exposed situations, it is admirably adapted to the above purpose, quickly furnishing a covering for the land until more desirable trees may get a foothold. Bolle's poplar, a form of the white, or silver-leaf, poplar, is quite ornamental in its lobed leaves; the white or silver-leaf poplar is a native of Europe and Asia. Another ornamental tree and one frequently used where quick growth is desired, is the eastern cottonwood, or Carolina poplar, common in eastern North America. There also is the Lombardy, or Italian, poplar, from Europe and Asia, with its tall spire-like growth. Among the willows are the golden willow, from eastern North America, and the weeping willow, native of Asia, a tree commonly planted for ornamental purposes, and sometimes known as Napoleon's willow.

The walnuts and their relatives will be found to the west of the nursery on the ridge. The narrow-winged wing-nut, from China, and the Rhoeas-leaved wing-nut from Japan, are both here. Of the walnuts (*Juglans*), the English walnut, native from southeastern Europe to China, produces a most desirable nut, often called Madeira nut; the Romans introduced it into Italy, and from that place as a center its cultivation has spread in all directions, both in the Old World and the New; the nuts form a common article of food in southern Europe; in Europe and northern India an oil, called walnut-oil, used as a substitute for olive-oil, is obtained by subjecting the seed-leaves to pressure. The black walnut

VIEW IN THE ARBORETUM

and the butternut are both wild elsewhere in the Garden. The pecan-nut (*Hicoria pecan*), wild in the south central United States, is another nut of popular favor, as is also the big shag-bark or king-nut, of the eastern United States. The water hickory, of the southeastern United States, and the bitter-nut or swamp hickory, of eastern North America, are both represented, while the common shag-bark hickory and the pig-nut grow elsewhere in the grounds.

The birch family is located on both sides of the driveway to the south and southwest of the stable, where birches, alders, and hornbeams are planted; the Japanese hornbeam is represented by a single specimen along the road to the propagating houses; the American hornbeam is common in Bronx Park, and the hop-hornbeam is occasional. Those desiring to study the birches (*Betula*) will find several species available; one of these is the yellow birch, which grows wild in eastern North America, and is one of our most valuable timber trees; the wood, on account of its closeness of grain, strength and hardness, is suitable for many purposes. Another is the paper, or canoe, birch, of frequent occurrence in northern North America; the wood of this is preferred to that of any other tree for the manufacture of spools, and is also used in the manufacture of shoe-lasts and pegs; the Indians also make use of its wood in the manufactures of sledges, and from its tough bark they also make canoes and baskets. The Japanese white birch, a close relative of the American and European white birches, is represented. The river or red birch may be seen here; it is frequent along streams and lakes in the eastern parts of the United States; its wood is used in the manufacture of furniture. The black, or sweet birch, and the poplar-leaved birch are wild elsewhere in the Garden. The alders are present in several species: the dye alder, of Japan which becomes a large tree; the Japanese alder, also of Japan; the speckled, or hoary, alder, of north temperate regions; and the European tree alder.

The area devoted to the beech family lies to the westward of that assigned to the walnut and birch families, and on both

sides of the road leading to the Lorillard mansion. The oaks, the chestnuts, and the beeches belong here. The oaks (*Quercus*) are represented by many species. One of those to the east of the road referred to above is the pinnatifid-leaved oak, from Japan, with its odd leaves cut into long linear lobes; it is said to be a form of the toothed oak of Japan. Near by is the rock chestnut oak, of eastern North America; its wood is strong and durable, especially when in contact with the soil, and is therefore of great value for railroad ties and fence posts, and its bark is largely used for tanning. The mossy-cup, or bur oak, also of eastern North America, will be found here; this was discovered by the botanist Michaux in 1795, and is a valuable timber tree, its wood largely used for boat-building, for the manufacture of carriages and agricultural implements, for the interior finish of houses, and, on account of its durability in contact with the soil, for railroad ties. To the west of the road will be found other oaks. The red oak and the swamp white oak are natives of eastern North America; the latter is also a good timber tree, its wood being used for cabinet work and in various kinds of construction. The Japanese silkworm oak forms a part of this collection; its leaves are much like those of the chestnut, and might easily be mistaken for them; it is often planted in Japan in the silk districts, as its leaves are available as food for the silkworms, whence its name; the Japanese make charcoal from its wood, and from the bark they extract a black dye. The post, or iron, oak is a native of the eastern United States. Here may be seen also the sessile-flowered English oak, a native of Europe and western Asia. The large-toothed oak, of Japan, a valued timber tree there, is represented near by; as is also the gland-bearing oak, another Japanese species. The shingle, or laurel, oak, of the central parts of the United States, is not of much commercial value, as its wood checks badly in drying; it is sometimes used in making clapboards and shingles. Schneck's red oak comes from the south central parts of the United States. The Turkey oak, of southeastern Europe and western Asia,

is valued in that region on account of its bark which is used in tanning leather. The swamp oak, the scarlet oak, the black oak and the white oak are to be seen in large wild specimens elsewhere in the grounds.

The chestnuts (*Castanea*) are represented by the Japanese chestnut, of China and Japan; in addition to this, in various parts of the grounds, the American chestnut will be found in many wild specimens. The beeches (*Fagus*) are located to the westward of the chestnuts, in the north part of the swale. The European beech and its purple-leaved variety will both be found here in small recently planted trees. Small trees of the American beech are also here, but large wild specimens will be found along the driveways and paths in the vicinity; the wood of the beech takes a high polish, and is largely used for furniture, while the nuts are edible. The uses of the European beech are about the same as those of the American.

The elm family, to which belong the elms, the hackberries, or sugarberries, and the water-elms, is located on the ridge to the north of the stable. Among the elms (*Ulmus*) to be found here is the Scotch, or Wych, elm, a native of Europe and Siberia; the late-flowering elm, growing wild from Tennessee to Alabama; the cork, or rock, elm, of northeastern North America; the Chinese elm, of northern China and Japan; and the winged elm or wahoo, of the southeastern United States. The American elm and the slippery elm are wild in the grounds. The hackberries (*Celtis*) represented are the southern hackberry, of the southeastern United States; and the American nettle-tree or sugar-berry, of eastern North America. The water-elms are illustrated by the pointed water-elm, a native of Japan. The mulberry family is represented by the osage orange (*Toxylon*), trees of which will be found to the south of the driveway; it is a native of the central parts of the United States; the red mulberry and the white mulberry are wild. The cercis-leaf family has for a representative the cercis-leaf, of Japan, located just to the south of the row of tulip-trees just east of

the Bronx River. The magnolia family will be found mainly in the swale lying between the two ridges, with a few specimens on the western slope of the west ridge. Fraser's magnolia is one of those to be seen here; it is a native of the mountain woods from Virginia to Florida and Mississippi. The tulip-tree is shown by a row of fine wild specimens just to the south of the long bridge over the Bronx River, the largest trees within the grounds of the Garden. This tree is native of the eastern United States and yields a valuable lumber known as yellow poplar or whitewood; the Indians formerly made their canoes from this wood.

The plane-trees will be found just to the north of the elms. Here is a small tree of the oriental plane, native from southeastern Europe to India. A little to the southwest of this is a large specimen, native to the grounds, of the American plane, known also as the button-wood and button-ball, and there are many other wild trees along the Bronx River. The oriental plane is largely used as a shade tree in Europe, and is sometimes planted in this country. The wood of the American plane, or button-wood, is largely used in the manufacture of boxes for tobacco, for furniture, and for the interior finishing of houses.

The apple family and the plum family are located to the north of the driveway leading to the long bridge. In the apple family will be found some of the tree hawthorns and thorns, including the Washington thorn, a native of the southeastern United States. Following to the west are some of the true apples (*Malus*), among them the Siberian crab-apple, a native of eastern Asia; the prune-leaved crab-apple, a native of northern China and Japan; and Soulard's crab-apple, from the central United States. In the plum family, among others, will be found, the rose-bud cherry, a Japanese plant, and a highly decorative species; the double form of the Japanese flowering cherry, native throughout eastern Asia; the ordinary sweet cherry, originally from Europe and western Asia, a delicious fruit, of which there are many horticultural forms; and the ever-blooming cherry.

Near the eastern end of the long bridge are trees illustrating the senna family, the pea family, the rue family, and the mahogany family. One of those in the senna family is the honey-locust or three-horned acacia (*Gleditsia*), a native of the southeastern United States; its durability when in contact with the ground makes its wood of especial value for fence posts, for which purpose it is largely used; from China and Japan comes the Japanese locust, also represented here. One of the representatives of the pea family, from the Amur region, is the Amur yellow-wood (*Maackia*). Another is the locust-tree (*Robinia*), a native of the southeastern United States, but extensively naturalized elsewhere; its wood is hard and close-grained, and is very durable when in contact with ground or with water, so the high value in which it is held for fence posts and for ship-building may be readily understood. The rue family has for representatives the Japanese cork-tree (*Phellodendron*), from Japan, and the Chinese cork-tree, from the Amur region, China and Japan. The mahogany-tree family has a single species represented, the Chinese bastard-cedar, a native of China; the mahogany tree itself, and other representatives of the family, will be found at the conservatories.

On the ridge to the northeast of the apple family, and to the west of the new conservatory site, are trees of the ailanthus and sumac families. The former is represented by the *Ailanthus*, or tree-of-heaven, a native of China, but extensively naturalized in the eastern parts of the United States, where in some places it has become a nuisance, both on account of its ill-smelling staminate flowers and its habit of freely suckering from the roots. Among the sumacs (*Rhus*) are Osbeck's sumac, from China; the staghorn sumac, native of the eastern United States, from the young shoots of which the pipes for drawing off sap from sugar-maple trees are often made; the bark of its root is especially rich in tannin; the narrow-winged sumac is a representative from the Himalayan region.

On the ridge to the west of the new conservatory site, and

to the north of the sumac family, are the maple and buckeye families. The maples (*Acer*) are represented by a number of species. Perhaps the most important of these is the sugar, or rock, maple, a native of eastern North America, and the principal tree yielding maple sugar and syrup. The sap is usually collected from late in February to early in April; trees from twenty to thirty years old are considered the most productive, and a tree will usually yield in a season from four to six pounds of sugar, some giving less and others much more. This tree is often planted for shade along streets and in parks, its beautiful coloring in the fall enhancing its value for this purpose. Its wood is largely used for making furniture, in ship-building, for tool-handles, and for shoe-lasts and pegs. Another tree here is the red maple, ranging throughout eastern North America; its wood is now used in large quantities for the manufacture of furniture of various kinds, for gun-stocks, etc. The striped, or goose-foot, maple, sometimes known also as moosewood, of north-eastern North America, is a pretty decorative species, especially attractive on account of the beautiful marking of its bark. Two Old World representatives are the common European maple, of Europe and western Asia, and the sycamore maple, from Europe and the Orient. The sycamore maple is a valuable timber tree in Europe; its wood is used in the manufacture of musical instruments, spoons and other household utensils. From the southeastern United States comes the white-barked maple, also in the collection. The ash-leaved maple, or box elder, of eastern North America, is represented by several specimens.

In the buckeye family is the common horse-chestnut (*Aesculus*); for a long time the native country of this tree was unknown, and its home was ascribed by different authors to various lands; it has been pretty well established now that it is indigenous to the mountains of Greece. Another tree here is the fetid, or Ohio, buckeye, of the central United States; its wood, as well as that of some of the other kinds of buckeye, is manufactured into artificial limbs, for which purpose

it is highly esteemed; it is also used for wooden-ware and paper pulp. To the north of the buckeye family is the linden family. The American linden, or basswood, found over the eastern parts of North America, is here; it produces a large amount of lumber under the name of whitewood, which is used in the manufacture of wooden-ware, furniture, and carriage bodies; it is also largely used in the manufacture of paper pulp. Another species is the cordate linden, a native of Europe and Siberia, and a third is the white, or silver, linden of eastern Europe.

Next in the sequence comes the ginseng family, represented by several species of aralia; many other species of this family will be found at the conservatories. West of these is the ebony family, represented by the persimmon or date-plum (*Diospyros*), a native of the southeastern United States; its wood is preferred for the manufacture of shuttles; its fruit contains tannin, which gives it its astringent properties; this fruit, when fully ripe, is eaten in large quantities in the southern states, and is also offered for sale in the markets of the north; the Indians of the south at one time made bread of the dried fruit. Few members of this family are hardy in this latitude, so other representatives must be sought for at the conservatories.

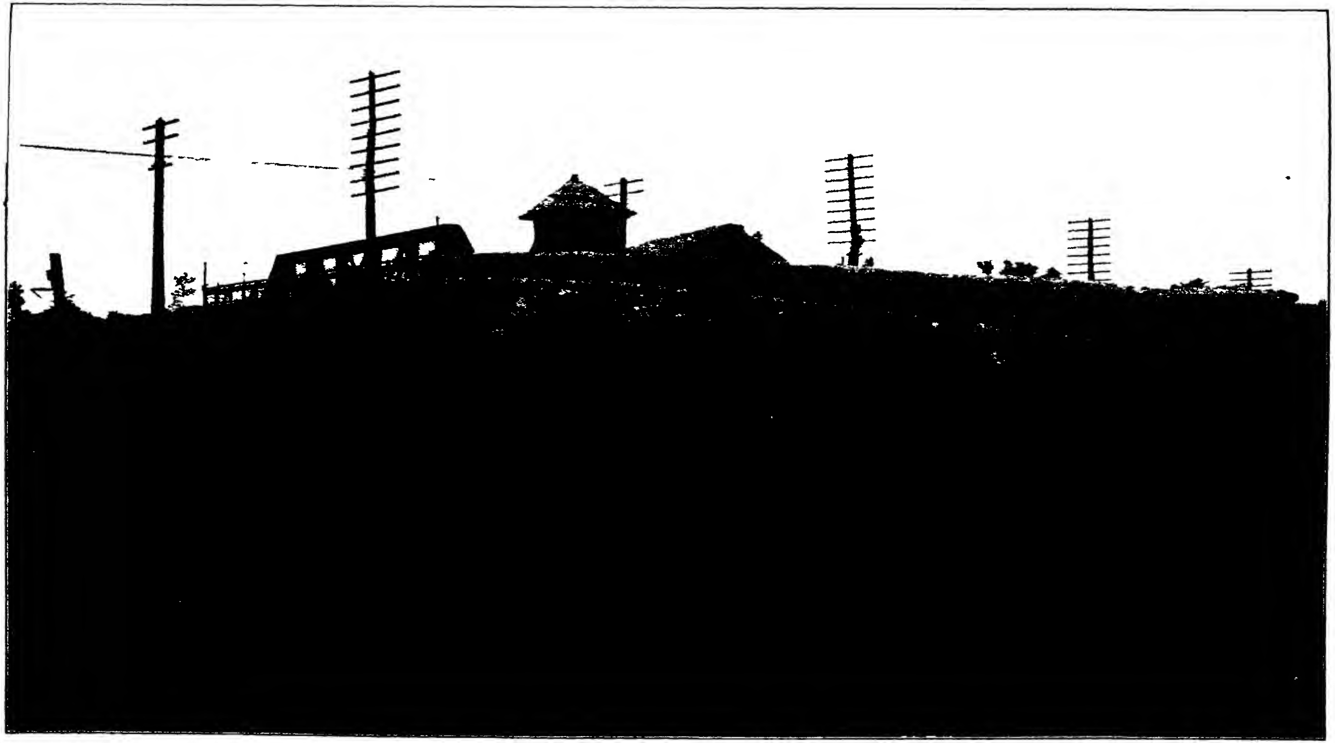
Beyond the ginseng family, on the western slope of the hill, is the olive family, represented by several species of the ashes (*Fraxinus*), some of which are useful for timber. The common European ash is to be seen, and among North American representatives are the green ash; the Texas ash, restricted to that state; the Biltmore ash, from Pennsylvania to Georgia; the white ash and the red ash are common; Bunge's ash, a native of China, is also represented. Following to the north is the figwort family, represented by *Paulownia*, a native of Japan. Terminating the sequence is the trumpet-creeper family, represented by species of *Catalpa;* among these is the Indian bean, a native of woods in the Gulf States, and Kaempfer's catalpa, from China.

7. The Hemlock Forest

The forest of Canadian hemlock spruce along the Bronx River, within the portion of Bronx Park set apart for the New York Botanical Garden, is one of the most noteworthy natural features of the Borough of the Bronx, and has been characterized by a distinguished citizen as "the most precious natural possession of the city of New York."

This forest exists in the northern part of Bronx Park on the banks of the river and their contiguous hills; its greater area is on the western side of the stream, but it occupies a considerable space on the eastern side above the Lorillard mansion and below the "Blue Bridge." The area west of the river extends from just above the "Blue Bridge" down stream to a point nearly opposite the old Lorillard snuff mill, and is the part commonly designated "Hemlock Grove." Its total length along the river is approximately 3,000 feet; its greatest width, 900 feet, is at a point on the river about 700 feet above the water fall at the Lorillard mansion. The total area occupied by the trees on both sides of the river is between thirty-five and forty acres.

While this area is mostly covered by the hemlock spruces, and although they form its predominant vegetation, other trees are by no means lacking; beech, chestnut, sweet birch, red maple, hickory, oaks, dogwood, tulip-tree, and other trees occur, and their foliage protects the hemlocks from the sun in summer to a very considerable extent; there are no coniferous trees other than the hemlock, however, within the forest proper. The shade is too dense for the existence of much low vegetation, and this is also unable to grow at all vigorously in the soil formed largely of the decaying resinous hemlock leaves; it is only in open places left by the occasional uprooting of a tree or trees by gales that we see any considerable number of shrubs or herbaceous plants, their seeds brought into the forest by wind or by birds. In fact, the floor of the forest is characteristically devoid of vegetation, a feature shown by other forests of hemlock situated further north. The contrast in passing from the hemlock



MOS ARK AY ENTRANCE

woods to the contiguous hardwood area which borders them to the west and north, toward the museum building and the herbaceous grounds, is at once apparent, for here we see a luxuriant growth of shrubs and of herbs, including many of our most interesting wild flowers.

8. The Gorge of the Bronx River

The gorge of the Bronx River extends from the " Blue Bridge " at the north end of the Hemlock Forest southward for about a mile, nearly to Pelham Avenue, and is a most beautiful and picturesque natural feature, besides being of great geological significance; its depth from the summits of the hills on both sides averages nearly 75 feet, and its sides below the foot-bridge at the Lorillard mansion are nearly vertical rock faces. The hills on both sides are heavily wooded with hemlock spruces and other trees. In the upper part of the gorge the Bronx flows slowly, being held back by the dam forming the water-fall at the Lorillard mansion, and the elevation of its surface is only a few inches higher at the " Blue Bridge " than it is at the fall; after plunging over the dam, however, the river runs in its unobstructed natural channel with all the appearance of a mountain stream, which at high water is exceedingly beautiful.

9. North Meadows and River Woods

The Bronx River enters the northern end of the Garden from Williamsbridge, and flows as a slow stream southward to the water-fall at the Lorillard mansion, its surface being nearly level throughout this distance. It is spanned just inside the northern boundary of the Garden by a concrete-steel arched bridge with granite copings, which carries the main park driveway across it near the Newell Avenue entrance. The entire northern end of the Garden is formed of the flood plain of the Bronx River, consisting largely of grassy meadows and marshes which at average flow of the stream are several feet above its surface, but which at flood time are occasionally submerged for short periods, the whole

valley being a very interesting illustration of the behavior of a small stream with a large water-shed at and about its sources. Considerable areas of the marshy land have already been reclaimed by filling, and by the lowering of the dam forming the water-fall at the Lorillard mansion; the general plan contemplates a much further reduction in the amount of marshy ground, and a further lowering and deepening of the river by dredging, in order to take off freshets with greater rapidity. A part of this flood plain is occupied by the plantations of willows and poplars already described, and these will be considerably extended, but large areas of meadow will be left in their natural condition.

South of these open meadows, the valley of the river is much narrower and is occupied by several acres of characteristic river woods, containing a considerable variety of native trees and shrubs, extending south as far as the long driveway bridge near the northern end of the hemlock forest.

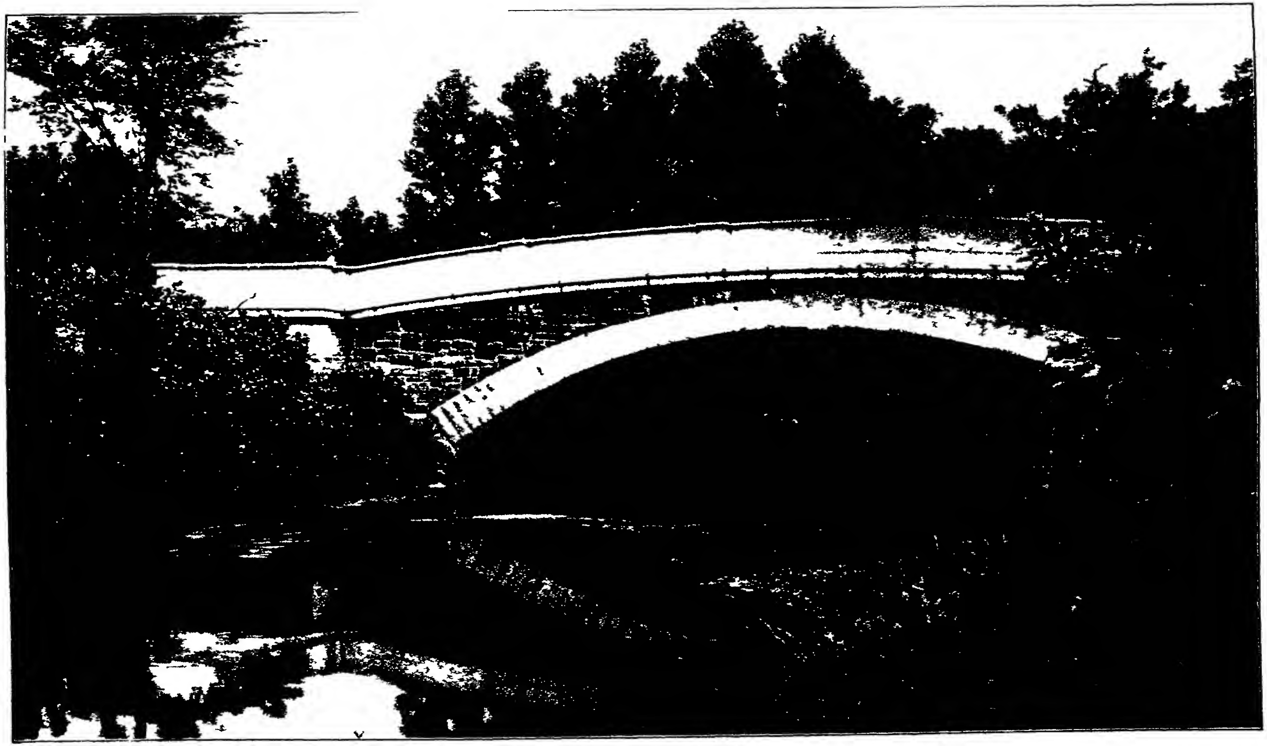
Park Features

The whole plan of the development of the Garden has been designed in such a manner as to include all the features of a public park, and it has been carried out in close coöperation with successive park commissioners and engineers of the Borough of the Bronx. The grounds are open to the public every day in the year without any charge whatever. An elaborate series of driveways provides several miles of Telford-Macadam roads, most of which are now constructed, with suitable entrances at eight points as follows:

1. Mosholu Parkway. 2. Bedford Park Avenue. 3. Southern Boulevard. 4. Hemlock Forest. 5. Southeastern entrance (not yet constructed). 6. Bleecker Street. 7. Newell Avenue. 8. Woodlawn Road.

Paths located so as to lead to all the principal features are included in the plan, with an aggregate length of over ten miles and approximately one-half of this system has already been built.

All the roads and paths have been located so as to do no



UPPER BRIDGE ACROSS THE BRONX RIVER

damage to the natural features of the grounds, particular care having been taken to save all possible standing trees and to avoid disturbing natural slopes except in the immediate neighborhood of the large buildings, where considerable grading has been necessary, but even here the study has been to adjust the new surfaces so that they shall merge imperceptibly into the original ones. Ornamental masonry retaining walls, made necessary by the grades of the roadways, have been built at the Mosholu Parkway entrance, at the Woodlawn road entrance, and at the approach to the Elevated Railway station, and vines have been planted at the bases of these walls which will ultimately clothe them with foliage, at least in part.

The plan of the driveway and path systems called for the construction of six bridges; three of these, first, the lake bridge, crossing the valley of the lakes near the museum building; second, the long bridge, which carries the driveway across the valley of the Bronx River north of the hemlock forest; and, third, the upper bridge which crosses the Bronx River at the northern end of the Garden, have been carried out in masonry arches from designs by Mr. John R. Brinley, landscape engineer of the Garden. A rubble stone foot-bridge of five arches, to replace the wooden bridge just at the northern end of the hemlock forest, and long known as the "Blue Bridge," is now under contract to be built on designs by the same engineer; studies are in progress for a bridge to replace the wooden bridge which crosses the gorge of the Bronx River at the Lorillard mansion; and the sixth bridge in the plan is a foot-bridge to cross the Bronx River in the north meadows, but this has not yet been designed, as its need is not yet urgent.

The park treatment further contemplates the planting of shade trees where these are needed along the driveways, and much of this has been done, a great many kinds of trees having been used, and many shrub plantations have been set out, especially at roadway and path intersections, utilizing considerable numbers of the same kinds of shrubs at different points.

The drainage of the grounds has been carried out in accordance with a well-studied original plan, which provides outlets for the surface drainage for the most part either into the lakes or into the river, only a small portion of it being taken into the sewers; a considerable portion of the drainage system still remains to be built.

The water supply has also been built in accordance with the general plan, and the system is being extended from year to year as the development of the grounds proceeds.

The general planting plan includes provision for completely surrounding the grounds, except at entrances, with border screens. This planting has already been accomplished along the entire western and northern boundaries, and partly along the southern boundary. These screens are composed of a very great variety of trees and shrubs, variously grouped, and average about fifty feet in width. It has not been practicable hitherto to plant these screens along the eastern border of the park on account of being obliged to wait for the construction of the street known as the Bronx Boulevard or Bronx Park East, the land for which is now being secured by the city by condemnation proceedings.

A feature of this border screen is an old-fashioned flower border, composed of herbaceous plants in large variety, which extends from the 200th street, or Bedford Park Avenue, entrance northward to the New York Central Railroad Station and thence to the Mosholu Parkway entrance; here herbaceous perennials are massed in front of a belt of flowering shrubs which in turn are backed by the trees of the border screen, and so selected that some of them are in bloom throughout the season. Among the plants used in this old-fashioned flower garden are daffodils, crocuses, irises, phloxes, paeonies, rose mallows, sun-flowers, cone-flowers, coreopsis, columbines, and many others.

Guides

In order to provide a method for viewing the collections under guidance, an aid leaves the front door of the Museum

A PART OF THE BORDER SCREEN

Building every week day afternoon at 3 o'clock, to escort all who may wish to accompany him. The routes are as follows:

Monday: Hemlock Forest and Herbaceous Garden. Tuesday: Pinetum. Wednesday: Fruticetum and North Meadows. Thursday: Deciduous Arboretum, Nurseries, Propagating Houses. Friday: Public Conservatories. Saturday: Museums.

City Ordinances

1. The picking of flowers, leaves, fruits, nuts, or the breaking of branches of any plants, either wild or cultivated, the uprooting of plants of any kind, the defacing of trees, and the carrying of flowers, fruits or plants into or from the grounds of the Garden, are prohibited, except by written permission of the Director-in-Chief of the Garden.
2. Leaving or depositing paper, boxes, glass or rubbish of any kind within the grounds of the Garden is forbidden.
3. Dogs are not allowed within the limits of the Garden except in leash.
4. It is forbidden to take fish from within the Garden, or to molest in any way squirrels, birds, snakes, frogs, toads, turtles or any other wild animals.
5. Throwing stones or other missiles, playing ball, football, tennis, or other game is prohibited.
6. It is forbidden to offer for sale food, candy, newspapers, books, tobacco, beverages, flowers or any other objects, without written permission from the Director-in-Chief and the Commissioner of Parks for the Borough of the Bronx.
7. Boating or rafting on the ponds, lakes and streams, is forbidden.
8. Trucking, or the driving of business wagons of any kind is forbidden on the roads of the Garden, except on those designated for such purposes.
9. It is forbidden to accept or solicit passengers for any cab, carriage, or other conveyance at any point within the grounds of the Garden, without written permission from the Director-in-Chief of the Garden and the Commissioner of Parks for the Borough of the Bronx.

10. Visitors are not allowed within the Garden after eleven o'clock at night nor before six o'clock in the morning, except upon driveways and paths designated for their use between those hours.

@@BULLETIN

OF

The New York Botanical Garden

Vol. 5. No. 17.

REPORT OF THE SECRETARY AND DIRECTOR-IN-CHIEF FOR THE YEAR 1906

(*Accepted and ordered printed, January 14, 1907.*)

To the Board of Managers of the New York Botanical Garden.

Gentlemen: I have the honor to submit herewith my report as Secretary and Director-in-Chief for the year ending January 14, 1907.

The development of the institution has gone forward in all departments; much additional construction work has been accomplished; the collections have been largely increased and their arrangement and labeling much improved; the educational work has been much expanded and the number of visitors has been greater than in any preceding year. The permanent funds of the Garden have been but slightly increased, no additions to the Endowment Fund having been obtained, and only one addition to the life membership list has been made. Contributions of money for special purposes by members of the Board of Managers and other friends of the Garden have made it possible to purchase some important collections and to carry on explorations in the West Indies and in Central America, by means of which much valuable material for the collections has been secured and additions to the knowledge of the tropical American flora have been made. Continuation of work on driveways, paths, bridges, grading, and drainage, has been carried on by means of an appropriation of $70,000, made by the city, which became available for expenditure in the spring, and the general main-

tenance of the institution has been accomplished for the most part by the annual appropriation made by the city for this purpose, which was $80,000; the amount appropriated for 1907 is $75,000.

The total membership of the Garden is now 1,135, an in crease during the year of 6.

Construction of Roads and Paths

The approach to the Mosholu Parkway entrance, which was partially constructed during 1905, was completed in July, 1906, and the driveway and paths were thrown open to the public as soon as the Park Department completed the portion of the parkway between the railroad bridge and the bridge across Webster Avenue in the autumn. As had been foreseen, this connection with Van Courtlandt Park at once increased the number of vehicles passing through the grounds and this increase was continuous until cold weather.

At the Woodlawn Road approach the masonry retaining walls and cut stone steps for the path connection were completed in the spring. The additional filling necessary there to carry the driveway was put in place during the spring and summer, and after having been given several months time to settle down, the driveway was paved, surfaced in a temporary way and thrown open to the public the first week in December. It will be necessary to complete the surfacing of this road in the spring, inasmuch as the supply of traprock screenings available was insufficient to entirely complete it, and several thousand cubic yards of earth filling are still necessary there to bring the northern slope of this embankment into a finished condition. Owing to certain defects in the masonry retaining walls the Finance Department of the city has refused to pay the entire amount of this contract to the contractor, and his claim is still in process of adjustment; these defects consist in wider masonry joints at several points than the contract permitted and also in slight deviations from the plan in the setting of some of the stones of the parapet.

The driveway leading from the Mosholu Parkway approach

eastwardly across the grounds over the Long Bridge spanning the valley of the Bronx River, was completed during the summer and, after considerable delay in securing the necessary lamps for lighting it at night, was thrown open to the public in the autumn.

Work has been prosecuted at intervals on the driveway leading from the east end of the Long Bridge northward along the east side of the River valley to the Newell Avenue entrance at the northern end of the Garden and all but about 600 feet of it is now paved.

The extension of the path system has gone forward at many points. A complete connection has been established between the New York Central and Hudson River Railroad station northward to the Woodlawn Road approach; the path from the Woodlawn Road approach easterly to the plaza north of the lakes, and one from the herbaceous garden eastwardly to the border of the hemlock forest have also been completed. In addition to these, the broken stone foundations for over a mile of path on the fruticetum plain, and leading to the economic garden east of the museum building, and along the northern side of the valley of the lakes, with short connections elsewhere, have also been built, but the impossibility of securing traprock screenings for surfacing in the latter part of the season made it impossible to complete them. The telford foundations for all these roads and paths have been obtained either from old stone walls or from the quarry operations behind the museum building, and the work of excavating stone can profitably be continued during the winter.

As soon as the main driveway across the Long Bridge was opened for use, the temporary road crossing the old wooden "Blue Bridge" at the northern end of the hemlock forest was closed to vehicles. This temporary road was built by means of a Park Department contract in 1900 and 1901, in order to obtain a stone road from the western side of the grounds to the stable and propagating houses on the eastern side; it was built essentially on the line laid down for a path on the general plan, and will now revert to the original inten-

tion; some work will be required in improving its curves and in narrowing it from its present width of 16 feet, to 10 or 12 feet, and owing to its heavy and continuous use as a road, it needs resurfacing.

Considerable portions of the driveways first built by the Park Department, and especially those lying east and south of the museum building, require resurfacing, and the attention of the Commissioner of Parks has been called to their condition.

Bridges

The masonry of the long five-arched bridge across the valley of the Bronx River, completed in the summer of 1905, has required no repairs and is an excellent piece of work. The curbstones to separate the driveway from the sidewalks on this bridge were set in place in the spring before the telford foundation of the road was built, and after the earth filling had been allowed to settle down all winter; and ashes from the power house are being used this winter to make the foundations for these sidewalks.

At the lake bridge, northeast of the museum building, the leak in the dam referred to in my last annual report has been stopped, in part by work done by the contractor and in part by the earth embankment built by us to form the shore of the upper lake at the western side of this bridge.

No work has been necessary at the driveway bridge crossing the Bronx River at the northern end of the garden.

A contract for the construction of a rubble stone foot-bridge to replace the old wooden "Blue Bridge" at the northern end of the hemlock forest, was awarded by the Commissioners of Parks on October 18 to D. D. Leahy for $11,000. The contractor has assembled considerable building material and machinery at this point and done some preliminary work; active operations here will be commenced in the spring; the structure should be completed by midsummer.

Grading

Excavation of rock and earth at the rear of the museum building, which has been going forward at intervals for

several years in order to establish the finished grades, has been continued, and several thousand cubic yards of material have been taken from that point for the foundations of roads and paths and for embankments about the lakes and elsewhere.

The filling necessary about the retaining walls at the approaches to the Mosholu Parkway and the Woodlawn Road was completed, covered with topsoil and either sodded or sown during the season.

The filling required along the railway at the west end of the valley of the lakes, between the railway and the driveway, has been nearly completed and the finished surfaces topsoiled. The grading required at both ends of the lake bridge has been nearly completed and a portion of the embankment here has been topsoiled and sodded.

The banks along the driveway crossing the fruticetum have been completed, topsoiled and sodded or sown, except near the west end of the long bridge where some grading still remains to be done. Considerable work in excavating and filling to form the finished banks along the driveway on the eastern side of the Bronx River north of the long bridge has been accomplished, as also along the main driveway east of the long bridge.

Much grading has been done at the site of the economic garden, east of the museum building, and the surfaces here have been completed and made ready for planting.

In addition to these larger works, minor grading operations have been carried out in various parts of the grounds.

Drainage

In the course of the construction of roads and paths, and in grading operations, additional grass gutters, catch-basins, and drain-pipe connections have been built at the Mosholu Parkway and Woodlawn Road approaches, at the lake bridge, and on the fruticetum plain. At the economic garden, a ditch with stone sides has been constructed to receive the surface drainage of the valley, and lead it to the water system

already established through the herbaceous garden. The system of grass gutters and catch-basins works very well except at a point just east of the museum building on the west side of the driveway, where the construction was complicated by standing trees which it was desirable to preserve; here the drainage from the driveway does not pass satisfactorily into the grass gutters and the edges of the road become washed in heavy storms. Some modification of the construction along this line will ultimately be necessary.

In the north meadows, where much filling and drainage still remains to be done, the drainage ditches have been kept open and the amount of marshy ground reduced to a minimum under present conditions. The lowering of the dam in the Bronx River at the Lorillard mansion, accomplished in the summer of 1902, at which time 16 inches was taken from the top of the dam, greatly improved the drainage of the north meadows, and has reclaimed several acres of land. It was proposed at that time to lower the dam two feet, but the Commissioner of Parks then desired to utilize the head of water at the dam for running a water-ram in order to fill a lake east of the river in Bronx Park, and 16 inches was found to be all that could be spared to make this practicable. This ram has recently been removed and the lake supplied with water from other sources; it is now desirable to return to the original plan and lower this dam about 8 inches more, which will reclaim more land in the northern part of the grounds and permit freshet water to flow off more rapidly than it does at present.

Water Supply

There has been no extension of the water-mains during the year. The work of grading and road building has now, however, been sufficiently advanced to make it desirable that at least 2,000 feet of 6-inch water-main should be laid during the coming season, in order to obtain more hose-taps for watering plants, more hydrants for watering-carts, additional drinking fountains, and to bring a satisfactory water-supply to the site of the new conservatories on the east side of the garden.

Buildings

Records of maintenance of buildings, the construction of additional cases and other furniture, will be found in the report of the First Assistant and in that of the Superintendent of Grounds hereto appended.

Plans for three houses and the boiler-house of the new public conservatories were completed in December; specifications for a contract were prepared and are now being printed by the Department of Parks; it is expected that a contract can be awarded for this work within a few weeks.

Plants and Planting

A great deal of additional planting has been accomplished during the year in many parts of the grounds, especially in the shrub collection (fruticetum) on the plain northeast of the museum building, in the collection of conifers (pinetum) on the hills and slopes near the public conservatories, in the herbaceous garden, and a commencement was made in the fall of establishing the economic garden. Many shade trees have been planted along the driveways, and the border screen along the railway has been completed by the planting of a belt of conifers and deciduous trees at the west end of the valley of the lakes. The crowded condition of the public conservatories has been relieved by the rejection of a large number of duplicate plants, many of which have been used in exchange with other institutions, and it is not possible to cultivate many more species in these houses than those now installed, but the construction of the new public conservatory will permit a great expansion of this collection. The total number of species under cultivation in all collections does not differ essentially from that reported a year ago. The policy of concentrating attention on the more complete labeling of the present collection, rather than on the material increase in the number of species, has been continued, and much progress has been made.

Detailed accounts of the collections of living plants, their cultivation and study, will be found in the report of the Head Gardener, hereto appended.

The Hemlock Grove

The forest of Canadian Hemlock Spruce continues in a healthy condition. In my last annual report I suggested that some restriction of the use of this natural woodland was desirable, and this has been in part effected by a more continuous system of patrolling by employees detailed for this service on Sundays and holidays and by keepers. The opening of the main park driveway across the long bridge north of the hemlock grove, and the closing of the temporary road across the old "Blue Bridge," and the construction of the path leading eastward from the north end of the herbaceous garden, has resulted in the closing of the grove to vehicles, in accordance with the original plan, and this has been a great advantage to pedestrians and is in all respects a condition to be maintained. Suggestions have been made from time to time of the desirability of constructing roads through the grove, but experience has demonstrated that this would be most undesirable, inasmuch as the demand could only be met by the building of roads not less than 25 feet wide in order to insure safety from collisions and prevent accidents to pedestrians, and such roads would greatly mar the natural beauty of the forest. A few fallen trees and branches and a few dead standing trees need to be removed, and, in accordance with the agreement of the Garden with the Department of Parks, this is being done at the present time, an official of the Park Department being detailed to observe the work. A portion of one of the trails leading into the grove from the herbaceous grounds had become washed by rains, leaving a number of stones protruding, and these were removed during the fall in accordance with the same agreement. The indiscriminate trampling of the floor of the forest, which I mentioned in my last annual report, has been somewhat reduced by the patrols, but still continues to a considerable extent. The railing or fencing along portions of the trails which I there suggested, has not been resorted to, though I still think it desirable, and propose to consider this subject further with the Commissioner of Parks and to report to you on this subject during the year.

Museums and Herbarium

The collections in the public museums have been increased in number by the addition of specimens not before represented, and increased in efficiency by the substitution of better specimens than those previously obtained, by rearrangements and by more complete labeling. The general plan of adding specimens to these collections only when provided with complete labels, which has been followed for some time, has brought them into a very perfect educational system. No new museum cases were added during the year, but some are now desirable, inasmuch as a considerable number of valuable specimens for which there is now no space in the museum cases, have accumulated in the storerooms.

The west hall of the basement floor which has never been equipped with cases but has been used at intervals for horticultural exhibitions in coöperation with the Horticultural Society of New York, should now be provided with both floor and wall cases, in order to make a more complete display of the series of fossil plants, which has been considerably augmented by field work and by purchase and exchange.

Large labels indicating the character of the several collections have been placed in the museum halls.

With the installation of the additional cases here indicated as desirable, the museum collections will become among the most complete and best labeled and displayed of any similar series in the world, but they can be much further developed.

The collections of dried pressed specimens have increased so rapidly that the present equipment of cases needs to be considerably augmented. Twelve cases were constructed during the year and installed where most needed and the collections redistributed.

As shown by the report of the Head Curator, hereto appended, the total increase of museum and herbarium specimens aggregated 81,776, obtained by gifts, purchases, exchanges, and exploration. Among noteworthy accessions are the great herbarium of mosses comprising at least 50,000 specimens, accumulated by the late William Mitten, Esq.,

the distinguished British bryologist, which was purchased by contributions of money made by Messrs D. O. Mills, Andrew Carnegie, J. Pierpont Morgan, James W. Ford, G. W. Perkins, and C. F. Cox; by securing this valuable herbarium, the collections of mosses at the Garden are now probably as complete as any in existence, and they will therefore be of great assistance to all American students of these plants. The herbarium of lichens, accumulated by Dr. H. E. Hasse, and presented by Mr. John I. Kane, has materially strengthened our collections of these interesting plants.

Details of the work in this department will be found in the report of the Head Curator.

Contributions of money for the increase of the museum and herbarium collections have been received from friends of the Garden and credited to the Museum and Herbarium Fund as follows:

D. O. Mills	$500.00
Andrew Carnegie	500.00
J. Pierpont Morgan	500.00
John I. Kane	250.00
James B. Ford	250.00
Geo. W. Perkins	150.00
C. F. Cox	100.00
Robert W. de Forest	50.00
N. L. Britton	250.00
Total	$2,550.00

Library

As shown by the report of the Librarian hereto appended, the number of volumes added during the year was 2,733 and the library now contains 20,362 volumes. The collection is rapidly becoming one of the most perfect of its kind, due to the policy adopted last year of empowering the firm of H. Georg & Company of Geneva, Switzerland, to obtain for the garden all of the older literature of botany, not already secured, which is offered for sale in Europe. In this way, many volumes have been secured which could not have been obtained by the ordinary methods of purchasing from the

printed book lists of dealers, on account of the competition for such works by other institutions. Several thousand volumes of the older literature still remain to be secured, however, and the process of securing them will naturally become slower as it proceeds, owing to the rarer volumes being less frequently obtainable, but by the continuance of the arrangement and by keeping up the recent publications, the collection may ultimately be made as complete as any in existence, the condition which is sought to be obtained.

Contributions of money, credited to the Special Book Fund and used for this purpose during the year, are as follows:

F. N. Warburg	$100.00
Samuel Thorne	100.00
Louis Haupt	10.00
Addison Brown	100.00
Total	$310.00

The growth of the library was provided for during the year by the construction of additional steel book-cases and the purchase of additional steel shelves, and the present equipment will probably be sufficient for the growth of the collection during 1907.

The number of institutions now on our exchange list for Garden BULLETIN or Garden CONTRIBUTIONS, or both, is now 570, as against 500 at the time of my last annual report, and the value of their publications received by us is correspondingly increased. An estimate of the monetary value of the publications which we annually receive in exchange has been carefully made, and is not less than $800.

Laboratories

The report of the Director of the Laboratories, hereto appended, gives details of the work directed by him and accomplished by students and by visiting botanists, both in the laboratories and in other departments of the Garden. No important changes have been made in the equipment or arrangement of the laboratories, and expenditures of this account have been required only for supplies, reagents, and some additional apparatus.

Additional interest in the tropical laboratory of the garden at Cinchona, Jamaica, has been evidenced by a larger number of students having occupied this station than in any previous year, and on account of a movement initiated by representatives of other institutions to aid in further developing this laboratory under a plan approved by the Scientific Directors of the Garden; this plan has been transmitted to representatives of forty-five universities, gardens, and museums, in America and England, and contemplates annual contributions by them for the support of a resident investigator at Cinchona, the contributing institutions to have the right to send students or officers there without charge for this privilege. The arrangement of the garden with the Government of Jamaica and the hearty coöperation of that Government renders the plan practicable in case a sufficient number of institutions or individuals agree to contribute $100 a year, the amount required for the successful elaboration of the proposition being from $1,500 to $2,000 annually. I propose to report the success or failure of this movement at a subsequent meeting.

The Garden's rental of Cinchona and its grounds from the Jamaican Government at $300 a year has already been of great advantage to us in securing plants and specimens, and students who have occupied the buildings have carried on some important investigations. An account of this work has been given by Professor Underwood in our JOURNAL for November, 1906.

Lectures and Demonstrations

The regular series of Saturday afternoon lectures during the spring and autumn have been continued, as reported in the JOURNAL for April and for October, and the audiences have somewhat increased over those of previous years. These lectures have been delivered at 4:30 in the afternoons, but it now appears more desirable that they should commence earlier and it is proposed that the series for the present year be announced for 4 o'clock.

The lectures and demonstrations commenced last year to

children and teachers of the public schools for the purpose of aiding them in their nature study were much elaborated, and have been reported upon in the JOURNAL for June and for December. The privilege was extended in the autumn to schools from Manhattan, only those from the Bronx having been previously provided for, and during October and November the lecture hall was used for this purpose on four afternoons of each week to audiences of children and teachers ranging from 600 to 850. Over 10,000 children have been given instruction in these courses during the year, and the success of the work makes the desirability of extending it as far as possible very evident. The demonstrations following each lecture increased in efficiency by the experience gained during the previous year.

In order to provide teachers who were unable to attend these lectures with the same information, a special course was organized for Saturday mornings in October and November, which was attended by an average of about fifty persons.

Guides and Guide-Books

In order to systematize the personal guidance of visitors, two aids have been detailed for meeting those who may desire guidance, at 3 o'clock every week day afternoon at the museum building, and the following schedule of routes to be taken has been established:

Monday: Hemlock Forest and Herbaceous Garden.

Tuesday: Pinetum.

Wednesday: Fruticetum and North Meadows.

Thursday: Deciduous Arboretum, Nurseries, Propagating Houses.

Friday: Public Conservatories.

Saturday: Museums.

This arrangement was completed late in the autumn, and large printed notices have been placed on the walls of the Museum Building, calling attention to it. I will report to you at a subsequent meeting upon the result of this experiment.

A Guide to the Conservatories with photographic illustra-

tion, prepared by Mr. George V. Nash, Head Gardener, was published in the JOURNAL for March.

At the request of the Scientific Directors, a complete guide-book to the grounds, buildings and collections has been prepared and published with photographic illustrations and a plan of the grounds, in our BULLETIN no. 16, issued December 18. A special edition of this BULLETIN re-paged, provided with an index, and bound in stiff covers, will be issued within a few weeks and placed on sale at twenty-five cents per copy.

Exploration

The increase of the collections of living plants and of museum and herbarium specimens has been largely accomplished through the field work of members of the staff detailed for that purpose, or by special agents, and the superiority of this method over any other, of obtaining the most desirable material, has been still more fully demonstrated. Detailed reports on most of this work have already been published in the JOURNAL.

The continuation of the exploration of the Bahama Islands, which was in progress by Mr. L. J. K. Brace, special agent, on Fortune Island, Long Cay, and Crooked Island, was completed in January. I spent the month of March in the exploration of Porto Rico, with the assistance of Mrs. Britton, Miss Delia W. Marble, Dr. Marshall A. Howe, of our curatorial staff, and with the coöperation of Mr. John F. Cowell, Director of the Buffalo Botanic Garden, and of Professor W. M. Wheeler, curator in the American Museum of Natural History. Collections of fossil plants of the Atlantic coastal plain from New Jersey to Martha's Vineyard were made during the month of June by Dr. Arthur Hollick, curator, in coöperation with Professor Edward C. Jeffrey, of Harvard University. Mr. Wm. R. Maxon, of the United States National Museum, spent the months of April and May as a special agent of the Garden in Costa Rica. Andros Island, the largest of the Bahamas, was explored during parts of July and August by Mr. L. J. K. Brace, special agent. I

visited the island of Jamaica in September, accompanied by Mrs. Britton, Miss Delia W. Marble and Professor Underwood, and explored parts of that island in coöperation with Mr. William Harris, Superintendent of Public Gardens and Plantations, and extensive collections have been made by Mr. Harris there at other times during the year. Mr. Norman Taylor, a Garden aid, was sent to eastern Cuba in August to accompany Professor B. E. Fernow, forest expert, and to explore a portion of the Sierra Maestra. Dr. Marshall A. Howe, curator, was sent to Jamaica early in December for the purpose of continuing the collection and study of West Indian algae, and is expected to return within a short time. Dr. J. A. Shafer, Museum Custodian, has been detailed for an exploration of the island of Montserrat, British West Indies, and sailed from New York on January 5.

Contributions of money which have made a considerable amount of this exploration work possible, credited to our Exploration Fund, have been received as follows:

William K. Vanderbilt	$100.00
Louis C. Tiffany	100.00
Cleveland H. Dodge	100.00
Isaac N. Seligman	100.00
Charles Lanier	100.00
Samuel Thorne	50.00
Wm. H. S. Wood	50.00
Francis L. Stetson	50.00
Hugh J. Chisholm	50.00
Thomas H. Hubbard	50.00
H. W. de Forest	25.00
Bernard G. Amend	25.00
Henry C. Frick	250.00
Total	$1,050.00

Investigations

The collections have been continuously increased in value by studies of members of the staff and assistants, by 41 registered students and by the work of visiting Curators and other officials of colleges, gardens, museums and other educational

institutions. Records of the work accomplished by the staff of the Garden will be found in the reports of the several officers hereto appended. The ordinary curatorial and administrative duties of the staff occupy most of their regular time, and large portions of their researches have been accomplished outside of the required hours of attendance. The record of student work will be found in the report of the Director of the Laboratories. The curatorial work often requires the expenditure of much time in determining the proper name and relationship of plants and specimens, and incidentally brings out a great many facts additional to knowledge, so that it is very closely interlocked with original investigation, a condition which is sought for in the organization of all modern educational institutions.

By means of our appropriation for investigations at other institutions, Dr. William A. Murrill, First Assistant, was enabled to study the collections of many gardens, museums, and herbaria in western Europe, during the summer, and he has published an account of his work in the October issue of the JOURNAL. He obtained a large amount of information which is important for use at the present stage of development of the Garden, secured a large number of specimens by arranging additional exchanges, and secured data which will enable him to complete his monograph of the North American polypores, to be published in a forthcoming part of NORTH AMERICAN FLORA.

Research Scholarships

Professor J. C. Arthur, of Purdue University, and his assistant Mr. Frank D. Kern, were awarded scholarships for one month each in January, to aid them in their investigation of the North American species of rusts, many of which are destructive to living plants and a menace to agriculture and horticulture; these microscopic and parasitic fungi have two or three stages in their life history, during one stage living on one species of plant while the other stages are mostly passed on another plant. Their work is embodied in the monograph of the North American rusts (Uredinales) now in press in

"NORTH AMERICAN FLORA." Our collections of these plants have been greatly increased in value and importance through the studies of these gentlemen.

Mr. C. B. Robinson, a graduate student of Columbia University, was granted a scholarship for three months to aid him in the completion of his monograph of the North American stone-worts (Characeae). The results of this study were published in our BULLETIN and constituted Mr. Robinson's dissertation for his degree of Doctor of Philosophy, which was awarded him by the University at its last commencement. His studies were largely based on the great collection of Characeae presented to the Garden some years ago by the late Dr. Timothy F. Allen, and this collection was materially improved and increased in the course of Dr. Robinson's work; in July he was appointed an Assistant Curator.

Professor T. C. Frye, of the University of the state of Washington, held a scholarship during the months of July and August, during which time he was occupied in an investigation of the mosses of that state and contributed many specimens of these plants to our herbarium.

Professor Raymond H. Pond, of Northwestern University, is at present in residence as a scholar engaged in investigations in plant physiology under the direction of Dr. Gager. He has held a scholarship for three months.

Miss Mary Perle Anderson is also in residence, having held a scholarship for three months, engaged in an investigation of the ferns of Japan under the direction of Professor Underwood.

Preservation of Native Plants

The income of the fund of $3,000 presented to the Garden by Misses Caroline and Olivia Phelps Stokes for the preservation of native plants, has for the most part been allowed to accumulate during the year, with the plan of utilizing it during 1907, together with this year's income, in providing the means for delivering a series of lectures in New York and other cities. One circular advocating the reservation of natural woodlands and the desirability of protecting

wild plants was issued. Plans are made for the expenditure of the accumulated income during 1907, together with funds provided by the Wild Flower Preservation Society of America, and by means of this joint effort it is believed that much good can be accomplished.

Administrative

Dr. William A. Murrill has continued as first assistant during the year and has divided with me the oversight of the maintenance of grounds, buildings and plantations, and has taken charge of the Garden during my absence in the spring and in the autumn. Mr. Percy Wilson, administrative assistant, has acted in this capacity during the year. Such time as I have been able to spare from admistrative duties has been mainly devoted to work on the "NORTH AMERICAN FLORA" and to the study and determination of collections of plants and specimens from the West Indies. I have also completed, with the assistance of Dr. Shafer, Museum Custodian, a descriptive work on the trees of North America, which may be published during the spring.

General Considerations

The development of the Garden has now been brought to a stage at which a relatively small addition to its annual income and a relatively small additional expenditure for construction would soon place it in the front rank of institutions of its kind. Its site, its buildings, and portions of its collections are already unsurpassed; the preparation of the grounds for decorative planting is well advanced, and its educational relationships and organization are most satisfactory. The driveways and bridges are nearly completed and the system of paths about one half built. The drainage and water supply are well advanced in construction. The number of visitors is already as great as that at any but two or three Old World establishments of the kind. Our income for 1907, exclusive of gifts which may be made for special purposes, will amount to about $102,000, composed of $75,000 granted by the city for maintenance and of about $27,000 from membership fees,

interest on permanent funds, sale of publications and sundries. The terms of our charter very properly prevent our obtaining any income from admittance charges, as it is provided that the grounds shall be open and free to the public daily, and the charter likewise forbids the granting of any special privileges from which income might be derived. The city allowance for maintenance is liberal, but the unexpectedly rapid development of the institution has caused it to be insufficient, so that a portion of the funds derived from membership fees or interest on investments will this year be needed to supplement it, and will thus reduce our power of increasing the collections and of developing our educational work. If our income other than that now provided by the city could be brought up to $50,000 annually, the needs of the Garden for the next decade would be met. The Finance Committee of the Board of Managers recognized this need in 1905 and made an appeal by means of a special circular in November of that year, recommending the increase of our endowment fund to $1,000,000, the permanent funds then amounting to about $335,000, but no immediate results were reached at that time. Our ordinary methods of obtaining additional annual members by means of distributing circulars inviting persons to join the Garden, are not materially increasing its membership, at the present time, and in order to obtain a considerably increased membership it evidently is necessary that some additional means should be employed. I believe that there are many persons interested in our work who would be quite willing to become members if the need for their coöperation could be more definitely placed before them.

Reports Appended

I submit also reports by the First Assistant, the Head Curator of the Museum and Herbarium, the Honorary Curator of the Economic Collections, the Librarian, the Head Gardener, the Superintendent of Grounds, and a schedule of expenditures under appropriations made by the Board of Managers.

Respectfully submitted,

N. L. BRITTON, *Director-in-Chief.*

REPORT OF THE FIRST ASSISTANT

Dr. N. L. Britton, Director-in-Chief.

Sir: I have the honor of presenting the following report for the year 1906.

Grounds

The roads and paths of the Garden have been cared for by employees of the Department of Parks as in previous years. The force now employed is hardly adequate for this purpose, owing to the rapid progress made in the construction of driveways and paths. The service road and the parkway near the conservatories have been resurfaced with screenings; the lamps have been removed from the unused path through the woods east of the herbaceous grounds and from the old road over the "blue ridge" to the new roads recently opened; and all the street lamps have been replaced by the Park Department with new ones of a better type.

Progress in construction of roads and paths in accordance with the general plan has made access to the grounds considerably easier, and has also brought about some changes, of which the closing of traffic on the old road leading across the "blue bridge" and the opening of the new road across the new bridge to the north of this is the most important. The rough trail leading from the herbaceous grounds into the hemlock forest has also been made over into an attractive path and fenced off at both ends from possible invasion by vehicles. The delivery road back of the museum building and the main driveway passing the building on the east have both received considerable attention as to grading, edging and draining. Borders, catch basins, signs, guard rails, water mains, etc., have also received due attention, as detailed in the report of the Superintendent of Grounds.

The report of the Head Gardener gives a detailed account of the condition of the plantations. The fruticetum has been greatly developed and improved and is now one of the most attractive parts of the Garden.

No serious damage to the plantations has occurred during the year, except the destruction of a fine oak by lightning and the ravages of a fungus disease among the chestnut trees. A few birch trees have been cut, but the guilty party was discovered before any serious damage was done. Thirty-five arrests have been made for violations of Garden rules and only two of the parties arrested escaped a fine. Prompt action on the part of those in charge has undoubtedly prevented more grievous violations.

Spraying against insect pests has been inaugurated on the grounds with good results. Extensive pruning of the chestnut trees has been tried with the hope of saving some, but the indications are that most of them will have to be cut in the near future.

The licensed hackmen stationed near the elevated railway approach have given both employees and visitors considerable annoyance and have repeatedly shown an utter disregard of the conditions laid down in their permits.

The increased development of the Garden in all its departments demands increased protection. A new night patrol has been appointed and a system arranged among the night watchmen by which better service is insured, but the force is still inadequate.

Visitors to the Garden have received personal attention by the system of guides inaugurated the past year, which admits of a rather careful inspection of a selected portion of the exhibits and grounds each day, beginning at 3 P. M.

Buildings

Museum

A slight rearrangement of the equipment in the various laboratories has been necessary on account of setting aside one of the rooms on the west wing as an office for the First Assistant. This room, together with the rooms adjoining it on the top floor, have been painted with white lead and zinc.

A mail cabinet containing a separate locker for each member of the Staff has been constructed and placed near

the main entrance. An additional case for lantern slides has been built to accommodate the large increase, especially in colored slides, during the year.

Two new cameras especially built for use in the field have been added to the photographic outfit. In spite of the large amount of photographic work connected with the increased lecture courses and the development of the living collections, it has been possible to so arrange it that practically all of this work has been done by the regular photographer within the usual hours set apart for this purpose.

On account of the great and increasing value of the books in the library, it has been deemed advisable to close this room henceforth at 5 P. M. in winter and 6 P. M. during the remainder of the year, and to allow no artificial light in it, except that of an electric hand-lamp, without the order of the Director or First Assistant. This arrangement also makes it possible to have the room under the direct charge of the Librarian or an assistant during the whole time that it is open. Members of the Staff may obtain books from the Librarian as formerly for use in the building during the evening.

CONSERVATORIES

Considerable painting has been done on the interior of the public greenhouses during the year; and a force pump has been installed for use in watering the palms and other tall plants, especially in house no. 1. The water-lilies in the court of the conservatories made a very satisfactory showing during the summer. Considerable use has been made of the Guide to the Conservatories published in the March number of the JOURNAL, and its distribution has awakened a wider and more intelligent interest in the collections there. A portion of the basement is at present used for repairs and storage of machinery and implements, but it is hoped that a separate building for this purpose may be erected at an early date.

The propagating houses are in a satisfactory condition. The loft has been improved by the addition of a skylight and a dark-room for photographic purposes. An additional house

(no. 6) has now been turned over almost entirely to the increasing collection of cacti that are being studied in a growing condition. About five hundred plants of various kinds have been propagated and transferred to the large conservatories during the year.

Other Buildings

The heating and power plant has been maintained in good order without alterations and with a minimum outlay for repairs. Although steam was turned on in the conservatories on September 24 this year, eleven days earlier than the record, the mild weather that has prevailed generally throughout the year has brought no severe strain on the heating plant.

The stable was repaired and painted with creosote paint in the spring. A new single wagon was purchased early in the summer. There is need of an additional horse for driving and a new buggy to replace the one now in use.

Publications

Journal

The Journal has appeared each month during the year, making a volume of 300 pages with 7 plates and 43 figures. This increase in size over former volumes is partly due to the large size of the March number, devoted to a detailed description of the conservatories, and partly to the increased development of all departments of the Garden.

Bulletin

Bulletin no. 13, issued June 25, 1906, comprises 194 pages and 14 plates. It contains the following papers, issued separately in advance, the first appearing in August, 1905, and the remainder in 1906: Contributions to the Flora of the Bahama Islands, II, by N. L. Britton; New American Coralline Algae, by M. Foslie and M. A. Howe (with plates 80–93); Contributions to the Flora of the Bahama Islands, III, by N. L. Britton; A Revision of the North American Vernonieae, by Henry Allan Gleason; and The Chareae of North America, by Charles Budd Robinson.

Bulletin no. 14, which together with nos. 12 and 13 will complete Vol. 4, has not yet been published.

Bulletin no. 15, with 106 pages, was issued February 13, 1906. It contains the annual reports of the Director-in-Chief, Assistant Director, Curator of the Museums and Herbarium, Honorary Curator of the Economic Collections, Librarian, Head Gardener, Superintendent of Buildings and Grounds, Scientific Directors, Committee on patrons, fellows and members, and Treasurer.

Bulletin no. 16, a Descriptive Guide to the Grounds, Buildings and Collections, was issued December 18, 1906. It contains 88 pages of text and 17 plates.

Contributions

Contributions reprinted from various periodicals during the year are as follows:

No. 74. The Polyporaceae of North America — XIII. The described species of *Bjerkandera*, *Trametes*, and *Coriolus*, by William Alphonso Murrill.

No. 75. Studies in North American Polygonaceae — I, II, by John K. Small.

No. 76. *Astragalus* and its segregates as represented in Colorado, by Per Axel Rydberg.

No. 77. The Delta of the Rio Colorado, by Daniel Trembly MacDougal.

No. 78. The Incapacity of the Date Endosperm for Self-digestion, by Raymond H. Pond.

No. 79. Affinities of certain Cretaceous plant remains commonly referred to the genera *Dammara* and *Brachyphyllum*, by Arthur Hollick and Edward C. Jeffrey.

No. 80. Heredity and the Origin of Species, by Daniel Trembly MacDougal.

No. 81. Studies in Etiolation, by Augustine Dawson Selby.

No. 82. Studies on the Rocky Mountain Flora — XVI, by Per Axel Rydberg.

No. 83. The Hemlock Grove on the Banks of the Bronx River and what it signifies, by N. L. Britton.

No. 84. The Pollen-Tube in some of the Cucurbitaceae, by Joseph Edward Kirkwood.

North American Flora

The North American Flora, designed to include descriptions of all known plants native to North America, Central America and the West Indies, is being issued in parts at irregular intervals as rapidly as these parts can be prepared.

Vol. 7, part 1, containing descriptions of the order Ustilaginales by G. P. Clinton, was issued October 4, 1906.

Vol. 7, part 2, containing descriptions of part of the order Uredinales is now in press.

Lectures

Public Lectures

Two series of lectures have been delivered to the general public on Saturday afternoons, one in the spring and one in the autumn. These lectures were as follows;

April 21. "On the Correlation of Characters in Plants," by Professor Hugo de Vries.

April 28. "A Day at Hammarby, the Home of Linnaeus," by Dr. W. A. Murrill.

May 5. "A Historical Review of the Study of Fossil Plants," by Dr. Arthur Hollick.

May 12. "A Glimpse at the Development of Botany in America," by Professor L. M. Underwood.

May 19. "The Effects of Radium on Plants," by Dr. C. Stuart Gager.

May 26. "Some Botanical Features of Porto Rico," by Dr. Marshall A. Howe.

June 2. "Orchids; Their Botanical Features and Relation to Horticulture," by Mr. G. V. Nash.

June 9. "The Wild Vegetable Foods of the United States," by Dr. H. H. Rusby.

June 16. "The Origin and Adaptations of Desert Floras," by Dr. D. T. MacDougal.

June 23. "The Botanical Exploration of the West Indies," by Dr. N. L. Britton.

October 13. "A Summer in Europe; Some Foreign Botanists and Botanical Institutions," by Dr. W. A. Murrill.

October 20. "The Vegetation of the Florida Keys," by Dr. M. A. Howe.

October 27. "How Plants Breathe," by Dr. C. Stuart Gager.

November 3. "Coal: Its Origin and Development," by Dr. Arthur Hollick.

November 10. "The Vegetation and Botanical Features of the Inaguas and Grand Turk, Bahamas," by Mr. G. V. Nash.

November 17. "Recent Explorations in the West Indies," by Dr. N. L. Britton.

November 24. "The Wild Nuts and Grains of North America," by Dr. H. H. Rusby.

A change in the hour of these lectures from 4:30 to 4:00, as recommended, will not interfere with plans for visiting the collections under the new system now in operation, which admits of inspection of the buildings and grounds under guidance, any day in the week at 3 P. M.

School Lectures

Two series of lectures have been given under the auspices of the Board of Education in connection with the nature study work of 4 B and 5 B grades of the City Schools. These lectures were at first confined to the pupils of the Bronx, but in the autumn of 1906 they were extended to those of Division III, Manhattan.

Grade 4 B

Lecture I, "Cultivation of Plants," by Mr. George V. Nash, was given to groups of pupils on April 27, May 4, May 11, October 5, October 11, October 12, and October 19.

Lecture II, "Seedless Plants," by Dr. Marshall A. Howe, on May 18, May 25, June 1, October 25, October 26, November 2, and November 9.

Grade 5 B

Lecture I, "Woody Plants and Plants Without Wood. Protection of Trees in Cities," by Dr. W. A. Murrill, on

April 24, May 1, May 8, October 23, October 30, November 8, and November 13.

Lecture II, "Industries Depending on Forests. Plant Products," by Dr. H. H. Rusby, on May 15, May 22, May 29, October 2, October 9, October 16, and October 18.

Lecture III, "Classification of Plants," by Dr. N. L. Britton, on June 5, June 8, June 12, November 15, November 16, November 20, and November 23.

In the autumn these lectures and demonstrations were repeated on five consecutive Saturday forenoons for the benefit of any teachers who desired to attend. Comparatively few teachers, however, availed themselves of this privilege.

Other Lectures

Lectures at other institutions by members of the staff have been given as follows:

February 15. Before the Academy of Science and Art of Pittsburg, on "Fossil Plants and Some Lessons Taught by Them," by Dr. Arthur Hollick.

May 9. Before the Richmond County Medical Society, Staten Island, on "The Geology of Staten Island Water Supplies," by Dr. Arthur Hollick.

May 9. Before the Horticultural Society of New York, on "Horticulture in the West Indies," by Dr. N. L. Britton.

May 23. Before the Torrey Botanical Club at its anniversary meeting, "A Historical Sketch of the Development of Botany in New York City," by Dr. H. H. Rusby.

November 13. At St. Andrew's Church, Richmond, Staten Island, on "A Canoe Trip Down the Yukon River, Alaska," by Dr. Arthur Hollick.

December 14. Before the New York Association of Biology Teachers, on "How can Secondary School Teachers of Biology maintain a spirit of Investigation while engaged in Teaching?," by Dr. C. Stuart Gager.

December 17. Before the New York Academy of Sciences, on "Color in Plants," by Dr. N. L. Britton.

December 28. At the American Museum of Natural History, "John Torrey," by Dr. N. L. Britton.

Scientific Meetings

The botanical conventions, held bi-weekly in the library on Wednesday afternoons, have been interesting and well attended. A list of topics discussed at these conventions during the past year is as follows:

January 24. "Isolation as a Factor in the Distribution of Species," by Dr. N. L. Britton, Professor F. E. Lloyd, and others.

February 7. "Winter Blossoms," by Mr. Percy Wilson; "The Flora of the Philippines," by Dr. C. B. Robinson; "A Cytological Study of Nectar Glands in *Vicia Faba*," by Mr. C. R. Stockard.

February 21. "The Botanical Situation in Porto Rico at the Present Time," by Dr. N. L. Britton, Dr. L. M. Underwood, Mrs. N. L. Britton and Dr. M. A. Howe.

March 7. "Remarks on the Flora of Haïti," by Mr. G. V. Nash; "Some Phytogeographical Features of the Prairies," by Dr. H. A. Gleason.

March 21. "Microscopic Examination of Cretaceous Lignites," by Dr. Arthur Hollick; "Remarks on the Malvaceae," by Mr. H. H. York; "Juvenile Forms of Cultivated Plants," by Mr. Norman Taylor.

April 4. "Recent Botanical Explorations in Porto Rico," by Dr. N. L. Britton, Mrs. N. L. Britton, Dr. M. A. Howe, and Miss D. W. Marble.

October 17. "Botanical Explorations in Jamaica," by Dr. N. L. Britton, Dr. L. M. Underwood, Mrs. N. L. Britton, and Miss D. W. Marble.

November 7. "Results of recent studies of the cretaceous lignites at Kreischerville," by Dr. Arthur Hollick.

November 21. "Solution Tension and Toxicity in relation to Enzymes," by Dr. R. H. Pond; "The Fern Genus *Antrophyum*," by Mr. R. C. Benedict; "Review of Literature," by Dr. C. Stuart Gager.

December 5. "Some Remarks on Fasciation," by Miss Alice A. Knox; "The Downy Mildews," by Mr. Guy W. Wilson.

December 19. "The Relation of Magnesium to Plant Growth," by Miss Gertrude Burlingham.

The Torrey Botanical Club has held six regular meetings during the year in the Laboratory of the Garden. The special meeting of May 23 in commemoration of the tenth anniversary of the commencement of work in the development of the Garden took place in the large lecture hall.

A field meeting of the Bronx Society of Arts and Sciences was held at the Garden July 21. The native tree flora found within the limits of the Garden, consisting of nearly fifty species, was examined and discussed at that time. This Society also held a regular meeting in the lecture hall of the Garden on the evening of October 18.

The Horticultural Society of New York held its annual meeting and exhibition in the Museum on May 9 and 10; its summer exhibition on June 13 and 14; and its autumn exhibition on October 12.

The American Association of Museums, a society organized during the past year, met at the Garden on May 19, holding both morning and afternoon sessions.

The Botanical Society of America met at the Garden on December 29.

Respectfully submitted,

W. A. MURRILL,
First Assistant.

REPORT OF THE HEAD CURATOR OF THE MUSEUMS AND HERBARIUM

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: I have the honor to submit herewith my report as Head Curator of the Museums and Herbarium for the year 1906:

Accessions

Specimens from nearly all parts of the world were received for the Museums and Herbarium. They were secured as follows:

(*a*) *Gifts and purchases.* A total of 54,140 specimens, consisting largely of miscellaneous plants from the Philippine Islands, western North America and tropical America, and the hepatics and mosses comprising the herbarium of the late Mr. Wm. Mitten, were brought together by these means.

(*b*) *Exchanges.* Exchanges with other institutions and with individuals added a total of 10,499 specimens to the collections. The greater part of these specimens are from North America, Europe and the Philippine Islands.

(*c*) *Exploration.* The several exploring expeditions brought back an aggregate of 17,137 specimens, which consist chiefly of plants from Porto Rico, Costa Rica, Jamaica, Cuba, subtropical Florida and temperate North America.

Collections were therefore increased by 81,776 specimens.

Museums

The utility of the collections comprising the public museums was increased by the addition of new specimens and the rearrangement of old ones. All additions were permanently labeled as they were installed. The permanent museum equipment was enlarged by the addition of minor appliances, and the acquisition of specimen jars as follows:

Glass jars. (Specimen jar, 2605, Whitall Tatum Co.).

Diameter.	Height.	Number of Jars.
3 inches.	6 inches.	36
3 "	8 "	216
3¾ "	10 "	120
4½ "	12 "	156
	Total,	528

I. ECONOMIC MUSEUM. The exhibits of this museum were increased by large collections of plant constituents, native North American foods and drug-plants, and by miscellaneous specimens. Portions of many of the exhibits were rearranged so as to show the specimens to better advantage.

II. SYSTEMATIC MUSEUM. The exhibits comprising the several elements of this museum were increased by both special collections and miscellaneous specimens.

(*a*) *The Synoptic Collection* was augmented by the addition of a large series of seaweeds and fungi, and by the interpolation of miscellaneous specimens in the other plant-groups.

(*b*) *The Microscope Exhibit* was maintained as heretofore, and has lately received a thorough overhauling, at which time worn parts of the instruments were replaced by new ones.

(*c*) *The Local Flora* has been developed by the installation of the red algae (Rhodophyceae), the brown algae (Phaeophyceae) and the stoneworts (Charales). Many colored plates to illustrate the fleshy fungi of the local flora have been received and will be put in the swinging frames at an early date.

III. FOSSIL PLANT MUSEUM. Additions to this museum came from both the eastern and western part of North America. They consist of valuable specimens from the Dakota group, the Devonian, the Triassic and the Lower Cretaceous, and of Cretaceous plant-remains in great variety from New York, New Jersey and Massachusetts, so that now the collection contains specimens of all the Cretaceous plants thus far found on Long Island and Block Island and most of those known to occur on Staten Island and Martha's Vineyard. More valuable type-specimens from older portions of this collection have been brought to light, labeled, and properly arranged.

Herbarium

I. MOUNTING AND CONSERVING OF SPECIMENS. A total of about 47,000 herbarium specimens selected from those

received during the year and from those acquired in previous years were poisoned, mounted and sorted into the permanent collections. These specimens fall into two groups, namely:

(*a*) *Flat or pressed specimens.* About 35,000 sheets of herbarium paper were used in mounting flat specimens. These sheets contain about 45,000 specimens, all of which have been sorted into their proper places in the cases.

(*b*) *Bulky specimens.* Approximately 2,000 specimens of dimensions unsuitable for mounting on sheets were placed in boxes and arranged in their proper places.

The collection of seeds and fruits contained in the multiple boxes was gone over specimen by specimen, thoroughly cleaned, and the whole series arranged in cases by families and genera. It is now easy of access and may be readily consulted.

2. Arrangement of the Herbaria. The main plant-groups are disposed about the same as they were last year. The congested condition of the flowering plants and the ferns, caused by the rapid growth of these groups, was relieved by the addition of new cases.

(*a*) *Garden Herbarium.* The portion of this series comprising the flowering plants was completely rearranged, the North American specimens being placed in species-covers, while the exotic specimens were conveniently arranged in genus-covers. Such portions of the collection comprising the flowerless plants as were needed for study, especially in connection with the preparation of manuscript for the North American Flora, were specially rearranged.

(*b*) *Columbia University Herbarium.* The specimens of certain families and genera of this series were remounted and strapped wherever necessary, while those portions used in connection with work on the North American Flora were rearranged to conform with the sequence of groups adopted in that work.

(*c*) *Duplicate Herbarium.* About 7,000 specimens, consisting chiefly of duplicate plants collected on the exploring expeditions maintained by the Garden in North America and

the Philippines, were sent to various institutions in exchange for other specimens.

Assistance and Investigation

Dr. Marshall A. Howe, Curator, has had charge of the collection of algae and also that of the hepatics, and has continued his studies of the marine algae of the West Indian region. In collaboration with Dr. M. Foslie of Trondhjem. Norway, he has published during the year two papers on algae belonging to the family Corallinaceae. One of these, "New American Coralline Algae," with 14 plates, appeared in the Garden BULLETIN; the second, on "Two new Coralline Algae from Culebra, Porto Rico," with 4 plates, was published in the *Bulletin of the Torrey Botanical Club*. The month of March was devoted to explorations in Porto Rico, in company with Dr. and Mrs. Britton, and in December he went to Jamaica to collect and study the marine algae of that island. Dr. Howe has continued to edit *Torreya* and has had a share in the work of instruction in nature study carried on by the Garden in connection with the public schools of the city.

Dr. W. A. Murrill, First Assistant, has cared for the mycological collection. In addition to the regular routine work connected with this collection, he has determined and reported upon about three thousand specimens of fungi sent in from various parts of this country and of Europe. He spent the summer studying type specimens in several important groups of the higher fungi at the principal mycological herbaria of Europe. A very serious disease of the native chestnut, epidemic about New York City, has been investigated and published upon by him during the year. His work upon the Polyporaceae of North America is now nearly complete and will soon be in shape for publication.

Mr. R. S. Williams, Assistant Curator, has been occupied in remounting and arranging the entire lichen collection, and at the same time incorporating with it the large duplicate set of lichens of the Leighton collection recently received from

the herbarium of the Royal Gardens at Kew, England. This work was interrupted by a visit to England made for the purpose of receiving and shipping to the Garden the Mitten collection of mosses and hepatics, as well as for the purpose of making comparisons of specimens at the museum of the Royal Gardens at Kew, and that of the British Museum, chiefly in connection with the work of continuing a report on Bolivian mosses, which was partly published several years ago.

Dr. C. B. Robinson, Assistant Curator, since his appointment on the first of July, has been occupied chiefly with the study of the flowering plants of the Philippine Islands, of which there are now over 10,000 sheets in the herbarium. He spent considerable time assisting in rearranging the Garden herbarium and also assisted in the demonstrations in nature-study courses carried on by the Garden in connection with the public schools of the city. He also spent his vacation exploring in Nova Scotia and brought back specimens of some 300 species, which were determined by him on his return to the Garden.

Dr. P. A. Rydberg, Curator, has, as heretofore, had charge of the herbarium of flowering plants. He has prepared a monograph of the first half of the family Rosaceae, which is to be published in a forthcoming part of the NORTH AMERICAN FLORA, and he has continued work on the Rocky Mountain Flora, which has been in preparation for some time. The Flora of Colorado, which was published by the Colorado Agricultural College, was issued as *Bulletin* no. 100 of the Experiment Station. "Studies on the Rocky Mountain Flora—XVI" was published in the *Bulletin of the Torrey Botanical Club*. Two other papers, "*Grayia* or *Eremosemium*" and "*Bossekia* or *Rubacer*," appeared in *Torreya*. Several weeks were spent by Dr. Rydberg at the National Herbarium for the purpose of studying the family Rosaceae and Rocky Mountain plants. He spent July in the field, mainly in the mountains of New York, and in the vicinity of Ottawa, Canada, devoting his time chiefly to the study of the native blackberries.

Dr. J. A. Shafer, Museum Custodian, has continued his studies on the Arborescent Flora of North America and on some North American drug-producing plants. He also prepared a List of the Vascular Flora of Ohio Pyle, Pa., from the plants collected during the Botanical Symposium of 1905, as well as from those collected on previous visits to that region.

Dr. Arthur Hollick, Curator, has had charge of the collection of fossil plants. With the assistance of Mr. Edward W. Humphreys, he has accomplished much as regards the nomenclature of fossil plants. This work has long been needed, especially in connection with the original labels on the specimens belonging to the Columbia University collection. The labels of the public exhibits were revised by Dr. Hollick and all of them brought up to date. A large amount of Cretaceous material of the Northeastern United States was collected jointly with Dr. E. C. Jeffrey of Harvard University. A preliminary paper under the joint authorship of Dr. Hollick and Dr. Jeffrey has already been issued. "Affinities of Certain Cretaceous Plant Remains Commonly Referred to the Genera *Dammara* and *Brachyphyllum*" appeared in the *American Naturalist* for March, 1906, and further investigations of the material just referred to are under way.

Mrs. Britton continued the supervision of the collection of mosses, and gave especial attention to naming the specimens collected in Porto Rico and Jamaica, having accompanied Dr. Britton on his expeditions to the higher mountains of these islands and assisted in collecting and preparing specimens of lichens and fungi. Miss Delia W. Marble also went on both these expeditions and gave efficient aid in collecting and preparing specimens. Short notes were published in the *Bryologist* by Mrs. Britton. She has also begun the incorporation of the herbarium of the late Mr. Mitten into the permanent moss collection.

Professor L. M. Underwood continued to devote the time he spent at the Garden to the development and improvement of the fern collection.

The writer, in addition to his general curatorial duties,

prepared monographs of the families Oxalidaceae, Linaceae and Crossosomataceae for forthcoming parts of the NORTH AMERICAN FLORA. He also continued his studies on the flora of the southeastern United States and, during November, explored portions of the southern peninsula of Florida and the Keys, collecting specimens of all plant groups and recording data for the further investigation of the relation of the flora of subtropical Florida to that of the West Indies.

Respectfully submitted,

J. K. SMALL,

Head Curator of the Museums and Herbarium.

REPORT OF THE HONORARY CURATOR OF THE ECONOMIC COLLECTIONS

Dr. N. L. Britton, Director-in-Chief.

Dear Sir: I have the honor to submit the following report for the year 1906.

The principal results of the year's work may be summarized in the statement that 651 specimens have been added to the collections and a large part of those already in the cases have been rearranged.

The specimens added include many of the most important, from a scientific as well as an economic view-point, in our possession. Early in the year, we received from Messrs. Merck & Company, of Darmstadt and New York, a collection prepared in the first named city, which has been the subject of discussion and correspondence for several years. The collection includes a set of rare drugs, many of which we had not been able previously to secure either by donation or purchase, and a very large and important set of proximate principles of plants, and other plant-constituents and products. An account of this collection has already been published (*Journal New York Botanical Garden* 7: 170. 1906). Many of these constituents are exceedingly rare and very valuable, pecuniarily as well as educationally. The donors very generously supplied the specimens in special exhibition vials, which admit of their examination to the best advantage. These specimens will prove of permanent value not only for exhibition purposes, but for supplying test material for comparison in any future investigations which may be conducted in our laboratories. The collection is at present arranged in one of the cases of the western wing, where it is necessarily crowded. It is contemplated to distribute it, as soon as our case room will permit, through a number of cases, and to place beside each constituent, or set of constituents, a specimen of the drug or plant-part from which it is extracted.

Of the other additions, special mention may be made of a

considerable number of wild vegetable foods accumulated in connection with a series of articles which I have been contributing to *Country Life in America*.

A collection of 250 specimens of foods and grains has been contributed by Mr. L. Bell Martin, and a number of tropical fruits by Mr. Ferdinand von Wilmouskey, of this city.

The rearrangement of the specimens referred to, especially of the rubbers, resins, sugars and starches, was rendered necessary to provide space for the Merck collection. Advantage was taken of this opportunity for effecting a more natural and instructive grouping of these articles. The same consideration has led us to make a pretty thorough rearrangement of the specimens of drugs and poisons.

Of the newly acquired specimens, many still remain in storage, owing to the want of suitable exhibition jars. The need for additional accommodation of this kind is urgent and threatens to check the development of our museum, so far as exhibition work is concerned.

During the late summer, I visited the Field Museum of Natural History, of Chicago, and also the lumber districts of Central Michigan, on the shore of Lake Huron. Separate reports of these visits have been submitted.

Although not directly connected with the Museum, the relations thereto of the Economic Garden, established late in the year, are so close that mention of the latter seems here desirable. Aside from its function as a part of the out-door exhibit, this garden will be certain to serve a useful purpose in supplying museum material, both for our own cases and for exchange purposes.

Respectfully submitted,

H. H. Rusby,

Honorary Curator of the Economic Collections.

ANNUAL REPORT OF THE DIRECTOR OF THE LABORATORIES

Dr. N. L. Britton, Director-in-Chief.

Sir: I have the honor to present herewith my report for the year ending December 31, 1906.

During the interval between January 1 and February 1, when my appointment took effect, the laboratories were under the general supervision of the First Assistant, Dr. W. A. Murrill, with the assistance of Miss Alice A. Knox.

When I entered upon my duties I found the laboratories and apparatus in excellent condition, and fifteen investigators registered. In addition to continuing my researches, which had been in progress at the Garden for nearly a year and a half, I at once gave my attention to administrative duties.

The conversion of the former apparatus room into the office of the First Assistant necessitated a rearrangement of some of the apparatus. The wall case of glass apparatus was transferred to the chemical laboratory, and the autoclave to the physiological room. The delicate analytical balances were removed from a table and placed on a stone shelf fastened firmly to the wall by metal brackets, thus making their accurate adjustment easier and less liable to disturbance. Reagent bottles of uniform size and style for holding stock reagents have been placed in the chemical laboratory, and the appearance of the physiological laboratory has been improved by staining and painting the experiment stands.

The increase in the number of investigators has made desirable a closer regulation of the use of material and of general apparatus, in order to keep a more satisfactory account of the stock on hand, and of the needs of the laboratory. To facilitate this a card catalogue has been prepared of all investigators now at work, and, incidentally, of all registered students since the laboratories were first opened. Each name card, with its data, is accompanied by an "apparatus card," indicating what laboratory apparatus has been assigned to the

given investigator. A second card index includes a careful inventory of all apparatus and reagents on hand, with the necessary data for reordering, and space for subsequent inventories of stock.

The appropriation for the laboratories has been expended in the purchase of material and apparatus as the needs of investigations in progress have made it necessary or desirable. Among the larger or more important pieces of apparatus purchased may be mentioned a hygrometer and a pair of balances, both for the Tropical Laboratory of the Garden, at Cinchona, and a Gordon's photomicrographic apparatus.

In connection with the special meeting of the Torrey Club, held in honor of the tenth anniversary of the commencement of work in the development of the Garden, on the afternoon of May 23, the laboratories were open to the inspection of the members of the Club and other friends of the Garden.

During the meeting of the American Association for the Advancement of Science and the Affiliated Societies, held in this city in Convocation week, a collation was served in the laboratories to members in attendance at the session of the Botanical Society of America, which was held at the Garden on December 29.

In connection with the exhibition of the New York Academy of Sciences, held at the American Museum of Natural History on December 28 and 29, to illustrate recent advancement in the different departments of science, I acted as vice-chairman of the general committee in charge of the botanical exhibit. Material was assembled from thirty departments of botany and botanical workers in different parts of the country, and the laboratories contributed to the exhibit of the Garden.

The work of the year has emphasized the need of more laboratory room, and especially of a suitable place within the museum building, for conducting experiments with living plants, now necessarily carried on at the propagating houses.

During the summer, consonant with the original terms of my appointment, I was for six weeks in charge of the summer work in botany in the Summer School of New York

University, giving one lecture daily from Monday to Friday, inclusive, from 8:30 to 9:30 A. M. Coincident with this work the botanical students of the Summer School enjoyed the advantages of the Garden collections in the museum, conservatories, and plantations.

In addition to the summer teaching and the two lectures in the spring and autumn courses of the Garden, I have given one address before the New York Association of Biology Teachers, on "How can Secondary School Teachers of Biology Maintain a Spirit of Investigation while Engaged in Teaching?" Several papers have been presented before various scientific societies, abstracts of which have been published in different periodicals; and published papers include four titles, besides numerous reviews and shorter notes.

On account of the great generosity of Mr. Hugo Lieber, of the firm H. Lieber & Co., of New York City, it has been possible to continue my studies on the effects of radium rays on various plant activities. Several thousand dollars' worth of reliable radium preparations have been at my disposal through Mr. Lieber's interest and liberality, and it has thus been possible to carry on for a period of over two years investigations of a nature and to an extent otherwise impossible. These experiments are yet in progress, with special reference to the effects of radium rays on unit characters in plants.

In connection with the radium work, Dr. William H. Parke, city bacteriologist, has very kindly placed at my disposal the facilities of the laboratories of the city health department, and the valuable assistance of members of his staff.

The experimental pedigreed cultures of the evening-primroses, conducted at the Garden for several years past, made available most valuable material for cytological studies in connection with the problems of heredity, mutation, and hybridization, and large quantities of this material have been collected and prepared for such studies.

Since the publication of "Species and Variations of Biotian Asters," by Professor E. S. Burgess, as Volume XIII of the Memoirs of the Torrey Botanical Club, Professor

Burgess has sent to the Garden seeds from fourteen of the species described in the memoir, and guarded pedigree cultures of these species have been started, with a view to an experimental study of the group.

Meteorological records have been kept during the year, including, as usual, continuous records of the temperature of the air, of the soil at depths of one foot and of three feet, and of the precipitation. The maximum temperature of 96° for the year occurred on September 19, and October 19, the minimum of 4° on February 6. The total precipitation recorded for the year was 41.60 inches, which was approximately one inch above the normal for the State of New York.

The Tropical Laboratory of the Garden, at Cinchona, Jamaica, was occupied during the spring by Professor Duncan S. Johnson, of Johns Hopkins University, and a party of students. Professor Johnson carried forward morphological and embryological studies, especially in the Piperaceae and Chloranthaceae. Dr. Forrest Shreve, of the Woman's College, Baltimore, Md., accompanied Professor Johnson, and made a study of the meteorology and phytoecology of the vicinity of the laboratory. A report of Dr. Shreve's work is published in the JOURNAL of the Garden 7: 193. 1906.

The fresh-water algae of the Blue mountain region, near the laboratory, were studied by Mr. I. F. Lewis, and 16 species, hitherto not reported from the Island, were collected. His entire collection represented about 50 species and 30 genera.

Mr. W. D. Hoyt investigated the gametophytic stages of the Hymenophyllaceae and of Psilotum.

During the summer, Professor A. W. Evans, of Yale University, and his assistant, Mr. George E. Nichols, were in residence at the laboratory. Professor Evans made studies of the Hepaticae, and Mr. Nichols of the distribution of the local mosses.

A report on the condition of the Tropical Laboratory was made to the Board of Scientific Directors by Professor

L. M. Underwood, on October 1, 1906. This report is published in the Garden JOURNAL 7: 250. 1906.

A total of 41 persons have had the privileges of the laboratories during the year ending December 31, 1906, as follows:

Investigators registered January 1, 1906	15
Registrations at the Garden since January 1, 1906	15
Registrations at the Tropical Laboratory	6
	36
Deduct for names counted twice	2
	34
Additional persons to whom privileges of the laboratories have been granted	7
Total number of investigators at the laboratories during 1906	41

The following is a list of these persons, together with their academic record, and the investigations they were pursuing:

* ANDERSON, MARY PERLE. Mt. Holyoke, B. S., 1890; Mass. Inst. Technology, '97–'98; Univ. Chicago, '01–'03. Supervisor, Nat. Study, Univ. School for Girls, Chicago, '01–'03.

Geographical distribution of the ferns of Japan.

ARTHUR, JOSEPH CHARLES. Iowa State Coll., B. S., '72; M. S., '77; Johns Hopkins, '78–'79; Harvard, '79; D.Sc., Cornell, '86; Bonn, '96. Prof. Veg. Physiol. and Pathol., Purdue, '87–. Botanist, Ind. Exp. Station, '88–.

Investigation of Uredinales.

BAKER, CARL FULLER. Mich. Agr. Coll., B.S., '92; Stanford, A.M., '03. Chief, Dept. Botany, Estacion Central Agron. de Cuba, '04–.

Taxonomy.

BANKER, HOWARD JAMES. Syracuse, A.B., '92; Columbia, Ph.D., '06. Prof. Biology, DePauw, '04–.

Taxonomy of the Hydnaceae.

BARRETT, MARY FRANKLIN. Smith, B.L., '01; Columbia, A.B., '05.

North American Tremelline Fungi.

---

* Research scholarship.

Benedict, Ralph Curtiss. Syracuse, A. B., '06.

The genus Antrophyum.

Billings, Elizabeth.

Fossil stipules and phyllodes.

Bray, William L. Cornell, '89–'91; Indiana, A.B., '93; Lake Forest, A.M., '98; Berlin, '96–'97; Chicago, Ph.D., '98. Assoc. Prof. Botany, Texas, '02–.

Taxonomy of the Spermatophyta of Texas.

Burlingham, Gertrude Simmons. Syracuse, A.B., '96.

Taxonomy of the Lactarii.

The effects of magnesium salts on plant growth.

Cannon, William Austin. Stanford, A.B., '99; A.M. '00; Columbia, Ph.D., '02.

The comparative histology of two species of the evening primrose and their hybrid progeny.

Cardiff, Ira Detrich. Knox, B.S., '97; Chicago, '99–'04; Columbia, Ph.D., '06. Prof. Botany, Univ. Utah, '06–.

A study of synapsis and reduction.

Revision of the Salviniaceae.

Cook, Melville Thurston. Stanford, A.B., '94; DePauw, A.M., '01; Ohio State, Ph.D., '04. Chief, Dept. Plant Path., Estacion Central Agron. de Cuba, '04–'06.

Embryology.

Insect galls.

Darling, Chester Arthur. Albion, A.B., '06; A.M., '06. Columbia, Asst. in Botany, '06–.

Morphology of the spermatophytes.

Plant physiology.

Emerson, Julia Titus. Teachers' College, Columbia, Spec. student, '99; Woods Holl, '99–'01.

The genus Andreaea.

Evans, Alexander William. Yale, Ph.B., '90; M.D.,' 92; Ph.D., '99. Prof. Botany, Yale, '06–.

Taxonomy of Hepaticae.

Evans, Helena. Syracuse, Ph.B., '01.

Morphology of mosses.

Gleason, Henry Allan. Illinois, B.S., '01; A.M., '04; Columbia, Ph.D., '06. Instruct. Botany, Illinois, '06–.

A revision of the North American Vernonieae.

GORDON, CLARENCE EVERETT. A.B., Columbia, A.M., '05.
Paleobotany.

GRUENBERG, BENJAMIN CHARLES. Minnesota, B.S., '96; Columbia, A.M., '04.
The germination of Corallorhiza Corallorhiza.

HAYNES, CAROLINE COVENTRY.
Taxonomy of the Hepaticae.

HOCKADAY, ELA. North Texas Normal School.
The lichens of Texas.

HOYT, WILLIAM DANA. Georgia, A.B., '01; M.S., '04; Johns Hopkins, '04–.
Studies of Hymenophyllaceae and of Psilotum.

HUMPHREYS, EDWIN WILLIAM. College of the City of New York, A.B., '03.
Indexing of paleobotanical names with referencc to synonomy and stratigraphy.

JOHNSON, DUNCAN STARR. Wesleyan, B.S., '92; Johns Hopkins, Ph.D., '97. Professor Botany, Johns Hopkins, '06–.
Morphology and embryology of the Piperaceae and Chloranthaceae.

KERN, FRANK DUNN. Iowa State, B.S., '04; Purdue, '05–.
Investigations of Uredinales.

KNOX, ALICE ADELAIDE. Smith, A.B., '99; Columbia, A.M., '06. Assistant, Dept. Bot. Research, Carnegie Inst., '06–.
Fasciation in the evening-primroses.

LEWIS, IVEY FOREMAN. North Carolina, A.B., '02; M.S., '03; Johns Hopkins, '03–.
Fresh water algae of Jamaica.

MACDOUGAL, DANIEL TREMBLY. DePauw, B.S., '90; Purdue, M.S., '91; DePauw, A.M., '93; Leipzig and Tübingen, '95–'96; Purdue, Ph.D., '97. Director, Dept. Bot. Research, Carnegie Inst., '06–.
Experimental evolution.

MIDDLETON, FLORENCE. Normal College, New York City.
Embryological studies.

NICHOLS, GEORGE E.
Distribution of Jamaican mosses.

PALLISER, HELEN LETITIA. Columbia, A.B., '05. Asst. Biology, Vassar, '06–.

Taxonomy of the North American Chaetomiaceae.

POND, RAYMOND HAYNES. Kansas State Agric. Coll., B.S., '98; M.S., '99; Michigan, Ph.D., '02. Prof. Bot. and Pharmacy, Northwestern, '03–.

Problems in enzyme activity.

ROBINSON, CHARLES BUDD, JR. Dalhousie (Halifax), B.A., '91; Cambridge, (Eng.), non-collegiate, '97–'98; Christ's coll., '98–'99; Columbia, Ph.D., '06. Assist. Curator, N. Y. Bot. Garden, '06–.

The Characeae of North America.

ROBINSON, WINIFRED JOSEPHINE. Michigan, A.B., '99; Columbia, M.A., '04. Instructor Bot., Vassar.

Systematic study of the ferns of the Sandwich Islands.

Life history of the filmy ferns.

SAGE, LILLIAN BELLE. Cornell, A.B., '01.

Morphology of mosses.

SEAVER, FRED JAY. Morningside, B.S., '02; Iowa State, M.S., '04. Instructor Biol., Iowa Wesleyan, '05–'06. Fellow in Botany, Columbia, '06–'07.

North American Hypocreales.

SHREVE, FORREST. Johns Hopkins, A.B., '01; Ph.D., '05. Prof. Bot., Woman's Coll., '06–.

Meteorology and phytoecology of Cinchona, Jamaica.

WILSON, GUY WEST. DePauw, B.S., '02; A.M., '03; Purdue, M.S. '06.

Taxonomy of the Phycomycetes.

YORK, HARLAN HARVEY. DePauw, B.S., '03; Ohio State, M.A., '05.

The Malvaceae of North America.

Respectfully submitted,

C. STUART GAGER,

Director of the Laboratories.

REPORT OF THE LIBRARIAN

To the Director-in-Chief.

Sir: I have the honor to submit the following report on the Library, covering the period from January 1, 1906, to January 1, 1907.

A census of the Library was taken December 17, and the number of bound volumes was then found to be 19,984 with 378 volumes in the bindery, making a total of 20,362 volumes, showing an increase for the year of 2,733 volumes. Of these, 1,057 were purchased from the special book fund, 184 volumes were presented to the Garden, the remainder having been acquired by subscription and exchange or by deposit from other institutions. Of those purchased from the special book fund, 832 titles, amounting to 918 volumes and pamphlets, were obtained through the special arrangement made by yourself with a firm in Europe in 1905 for the acquisition by the Garden of the works of the older botanical writers. This has resulted in the addition to the Library of a number of valuable works. No estimate has been made of the number of unbound pamphlets.

During the year 757 volumes have been bound, of which 84 volumes are serials and pamphlets deposited at the Garden by Columbia University.

The card-catalogue has been kept up to date; about 4,900 written cards having been added to it.

Additional exchanges have been arranged with other institutions, and the number of journals, periodicals, reports and other publications now received in that way in exchange for Garden publications, or by subscription, is about 570 as against 500 during 1905.

Accessions to the Library, other than serials and regular exchanges, have been published monthly in the Journal.

The rearrangement in 1905 of the steel book-stacks has proven satisfactory, and 75 steel shelves have been provided this year, furnishing considerable additional space.

Determinations and studies of the Asclepiadaceae have been continued. Some assistance has been rendered to Dr. D. T. MacDougal, the Director of Botanical Research in the Carnegie Institution of Washington, in the making of records of the cultures of evening-primroses maintained by him in the experimental grounds and in the collaboration with him and Dr. G. H. Shull, of the Station for Experimental Evolution of the Carnegie Institution of Washington, in the preparation for the press of the results of the experiments undertaken at the Garden in 1905–6 in a paper entitled "Mutations, Variations and Relationships of the Oenotheras," to be published by the Carnegie Institution of Washington. A monograph of Zygophyllaceae has been prepared for publication in the NORTH AMERICAN FLORA.

Respectfully submitted,

ANNA MURRAY VAIL,

Librarian.

LIST OF PERIODICALS.

* Académie Internationale de Géographie Botanique, Le Mans France. *Bulletin.*

Agricultural Experiment Station, Auburn, Ala.
" " " Tuskegee, Ala.
" " " Uniontown, Ala.
" " " Tucson, Ariz.
" " " Fayetteville, Ark.
" " " Berkeley, Calif.
" " " Fort Collins, Colo.
" " " New Haven, Conn.
" " " Storrs, Conn.
" " " Newark, Del.
" " " Lake City, Fla.
" " " Experiment, Ga.

* Periodicals subscribed for by the Garden.

† Periodicals subscribed for by Columbia University and deposited at the Garden.

‡ Periodicals received in exchange by the Torrey Botanical Club and deposited at the Garden.

All others are received in exchange by the Garden.

Agricultural	Experiment	Station,	Honolulu, Hawaii.
"	"	"	Moscow, Idaho.
"	"	"	Urbana, Ill.
"	"	"	Lafayette, Ind.
"	"	"	Ames, Iowa.
"	"	"	Manhattan, Kan.
"	"	"	Lexington, Ky.
"	"	"	Baton Rouge, La.
"	"	"	Orono, Me.
"	"	"	College Park, Md.
"	"	"	Amherst, Mass.
"	"	"	Agricultural College, Mich.
	"	"	St. Anthony Park, St. Paul, Minn.
"	"	"	Agricultural College, Miss.
"	"	"	Columbia, Mo.
"	"	"	Bozeman, Mont.
"	"	"	Lincoln, Neb.
"	"	"	Reno, Nev.
"	"	"	Durham, N. H.
"	"	"	New Brunswick, N. J.
"	"	"	Mesilla Park, N. Mex.
"	"	"	Geneva, N. Y.
"	"	"	Ithaca, N. Y.
"	"	"	Raleigh, N. C.
"	"	"	Fargo, N. D.
"	"	"	Wooster, Ohio.
"	"	"	Stillwater, Oklahoma.
"	"	"	Corvallis, Oregon.
"	"	"	State College, Pa.
"	"	"	Mayaguez, Porto Rico, W. I.
"	"	"	Kingston, R. I.
"	"	"	Clemson College, S. C.
"	"	"	Brookings, S. Dak.
"	"	"	Knoxville, Tenn.
"	"	"	College Station, Texas.
"	"	"	Logan, Utah.
"	"	"	Burlington, Vt.
"	"	"	Blacksburg, Va.
"	"	"	Morgantown, W. Va.

Agricultural Experiment Station, Pullman, Wash.
" " " Madison, Wis.
" " " Laramie, Wyo.
Agricultural Journal of India, Calcutta, India.
Agricultural Ledger, Calcutta, India.
Alabama. Geological Survey of Alabama, University, Ala. *Bulletin*, *Report*.
† Allgemeine Botanische Zeitschrift, Karlsruhe, Germany.
Amani. Biologisch-Landwirtschaftliches Institut, Bezirk Tanga, Deutsch-Ost-Afrika. *Berichte*.
America. Botanical Society of America. *Publications*.
America. Society of American Florists, Boston, Mass. *Proceedings*.
American Academy of Arts and Sciences, Boston, Mass. *Proceedings*.
American Agriculturist, New York, N. Y.
American Association for the Advancement of Science, Washington, D. C. *Proceedings*.
* American Botanist, Binghampton, N. Y.
American Florist, Chicago, Ill.
American Homes and Gardens, New York, N. Y.
American Journal of Pharmacy, Philadelphia, Pa.
American Journal of Science, New Haven, Conn.
American Museum of Natural History, New York, N. Y. *Bulletin*, *Report*.
‡ American Naturalist, Boston, Mass.
‡ American Philosophical Society, Philadelphia, Pa. *Proceedings*.
American Rose Society, New York, N. Y. *Bulletin*.
† Annales des Sciences Naturelles: Botanique; Paris, France.
Annales Mycologici, Berlin, Germany.
Annali di Botanica: see Rome, R. Istituto Botanico.
‡ Annals of Botany, London, England.
Antwerp. Jardin Botanique, Antwerp, Belgium. *Seed Lists*.
Appalachian Mountain Club, Boston, Mass. *Appalachia*.
Arboriculture: see International Society of Arboriculture.
* Archiv der Pharmazie, Berlin, Germany.
Ardennes. Société d'Histoire Naturelle, Charleville, France. *Bulletin*.
Argentine Republic. Museo de La Plata, Province de Buenos Aires. *Anales*.

Argentine Republic. Sociedad Cientifica Argentina, Buenos Aires. *Anales.*

Arkiv för Botanik: see Sweden, Kongliga Svenska Vetenskaps-Akademien.

Asiatic Society of Bengal: see Bengal, Asiatic Society.

Asmara. Ufficio Agrario Sperimentale, Asmara, Colonia Eritrea, N. E. Africa. *Bollettino.*

* Association Française pour l'Advancement des Sciences, Paris, France. *Compte Rendu.*

Association pour la Protection des Plantes, Geneva, Switzerland. *Bulletin.*

Audubon Park: see New Orleans.

Bambou: see Le Bambou.

Basle. Naturforschende Gesellschaft, Basle, Switzerland. *Verhandlungen.*

Bavaria. Bayerische Gesellschaft zur Erforschung der Heimischen Flora, Munich, Bavaria. *Berichte*, *Mittheilungen.*

* Beiträge zur Wissenschaftlichen Botanik, Stuttgart, Germany.

Belgium. Société Royale de Botanique de Belgique, Brussels, Belgium. *Bulletin.*

Belgrade. Jardin Botanique "Jevremovac," Belgrade, Servia. *Seed Lists.*

Belize. Botanical Garden, Belize, British Honduras, Central America.

Bengal. Asiatic Society of Bengal, Calcutta, India. *Journal.*

Bergianska Trädgården, Stockholm, Sweden. *Acta Horti Bergiani.*

‡ Berlin. Königlicher Botanischer Garten, Berlin, Germany. *Notizblatt.*

Bermuda. Report of the Board of Agriculture, Bermuda, W. I.

Bernice Pauahi Bishop Museum, Honolulu, Hawaii.

† Bibliotheca Botanica, Stuttgart, Germany.

* Biltmore Botanical Studies, Biltmore, N. C.

* Biologisches Centralblatt, Leipzig, Germany.

* Biometrika, London, England.

Bombay. Victoria Gardens, Bombay, India. *Report.*

Boston. Board of Commissioners of Department of Parks, Jamaica Plain, Mass. *Annual Report.*

Boston. Board of Metropolitan Park Commissioners, Boston, Mass. *Report.*

‡ Boston Society of Natural History, Boston, Mass. *Proceedings.*
Botanical Gazette, Chicago, Ill.
† Botanical Magazine, London, England.
Botanical Society of America: see America, Botanical Society.
† Botanische Jahrbücher, Leipzig, Germany.
† Botanische Zeitung, Leipzig, Germany.
† Botanischer Jahresbericht, Leipzig, Germany.
† Botanisches Centralblatt, Cassel, Germany.
† Botanisches Centralblatt: Beihefte, Cassel, Germany.
‡ Botanisk Tidsskrift: see Copenhagen, Société Botanique.
Botaniste: see Le Botaniste.
Botaniska Notiser, Lund, Sweden.
Brandenburg. Botanischer Verein der Provinz Brandenburg, Berlin, Germany. *Verhandlungen.*
Braunschweig. Herzoglicher Botanischer Garten, Brunswick, Germany. *Seed Lists.*
Bremen. Naturwissenschaftlicher Verein, Bremen, Germany. *Abhandlungen.*
* British Mycological Society, Worcester, England. *Transactions.*
Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y. *Report*, *Memoirs of Natural Science*, *Science Bulletin*, *Museum News*, *Cold Spring Harbor Monographs.*
Broteria: Revista de Sciencias Naturaes do Collegio de S. Fiel, Lisbon, Portugal.
Brussels. Institut Botanique de l'Université, Brussels, Belgium. *Recueil.*
Brussels. Jardin Botanique de l'État, Brussels, Belgium. *Bulletin.*
* Bryologist, Brooklyn, N. Y.
Bucharest. Institut Botanique, Bucharest, Roumania. *Bulletin de l'Herbier.*
Budapest. Horto Botanico Universitatis Budapestinensis. Budapest, Hungary. *Seed Lists.*
Buenos Aires. Jardin Botanico Municipal de Buenos Aires, Buenos Aires, Argentine Republic. *Seed Lists.*
Buenos Aires. Museo de Farmacologia, Buenos Aires, Argentine Republic. *Trabajos.*
Buenos Aires. Museo Nacional, Buenos Aires, Argentine Republic. *Anales.*
Buffalo Botanic Garden, West Seneca, N. Y.

Buffalo Park Commissioners, Buffalo, N. Y. *Annual Report.*
Buffalo Society of Natural Sciences, Buffalo, N. Y. *Bulletin.*
* Buitenzorg. Jardin Botanique, Buitenzorg, Java. *Annales.*
Buitenzorg. Jardin Botanique, Buitenzorg, Java. *Bulletin, Mededeelingen, Verslag, Icones Bogorienses.*
* Bulletin du Jardin Colonial et des Jardins d'Essai des Colonies Françaises, Paris, France.
Bulletin of Pharmacy, Detroit, Mich.
Calcutta. Indian Museum, Calcutta, India. *Indian Museum Notes.*
‡ Calcutta. Royal Botanical Gardens, Calcutta India. *Annals.*
California Academy of Sciences, San Francisco, Calif. *Proceedings.*
California State Agricultural Society, Sacramento, Calif. *Transactions.*
California State Board of Horticulture, Sacramento, Calif. *Report.*
California. University of California, Berkeley, Calif. *Contributions from the Botanical Seminary, Contributions from the Botanical Laboratory, Seed Lists.*
Canada. Botanical Club of Canada, Halifax, Canada. *Annual Report.*
Canada. Geological and Natural History Survey, Ottawa, Canada. *Contributions from the Herbarium.*
Canada. Report of the Minister of Agriculture, Ottawa, Canada.
‡ Canadian Record of Science, Montreal, Canada.
Carnegie Institution, Washington, D. C. *Yearbook, Publications.*
Carnegie Institution of Washington: Station for Experimental Evolution, Cold Spring Harbor, N. Y. *Papers, Report.*
Carnegie Institution of Washington: Desert Botanical Laboratory, Tucson, Arizona.
Carnegie Museum, Pittsburg, Pa.: *Publications.*
Cellule: see La Cellule.
* Centralblatt für Bakteriologie: Abtheilung I, Jena, Germany.
* Centralblatt für Bakteriologie: Abtheilung II, Jena, Germany.
Chicago. University of Chicago, Chicago, Ill. *Contributions from the Hull Botanical Laboratory.*
Chili. Museo Nacional, Santiago de Chile, Chili. *Anales.*
Christiania. Hortus Botanicus, Christiania, Norway. Seed Lists.
Christiania. Physiographiske Forening, Christiania, Norway. *Nit Magazin for Naturvidenskaberne.*

Christiania. Videnskabs-Selskabet. Christiania, Norway. *Skrifter.*

Cincinnati. Botanical Gardens, Cincinnati, Ohio.

Cincinnati Society of Natural History, Cincinnati, Ohio. *Journal.*

Clara Leigh Dwight Gardens, Mount Holyoke College, Mass. *Seed Lists.*

Cold Spring Harbor Monographs: see Brooklyn Institute of Arts and Sciences.

Cöln. Botanisher Garten der Stadt Cöln, Cologne, Germany. *Seed Lists.*

Colorado College Studies, Colorado Springs, Colo.

Colorado State Board of Agriculture Denver, Colo. *Annual Report.*

Colorado. University of Colorado, Boulder, Colo. *Studies.*

Columbia University, New York, N. Y. *Contributions from the Department of Botany*, *Memoirs of the Department of Botany*, *Contributions from the Department of Geology.*

† Columbus Horticultural Society, Columbus, Ohio. *Journal.*

Connecticut Academy of Arts and Sciences, New Haven, Conn *Transactions.*

Connecticut. Geological and Natural History Survey, Hartford, Conn. *Bulletin.*

Connecticut State Board of Agriculture, Hartford, Conn. *Annual Report.*

Copenhagen. Botanic Garden, Copenhagen, Denmark. *Arbejder.*

‡ Copenhagen. Société Botanique, Copenhagen, Denmark. *Botanisk Tidsskrift.*

Costa Rica. Sociedad Nacional de Agricultura, San José de Costa Rica. *Boletin.*

Country Life in America and The Country Calendar, New York City, N. Y.

Cracow. Académie des Sciences de Cracovie, Cracow, Austria. *Bulletin International*, *Catalogue of Polish Scientific Literature.*

Cuba. Estación Central Agronómica, Santiago de las Vegas, Cuba, W. I. *Circular*, *Bulletin.*

Curtis' Botanical Magazine: see Botanical Magazine.

Davenport Academy of Sciences, Davenport, Ia. *Proceedings.*

Dennison University, Granville, O. *Bulletin of the Scientific Laboratories.*

Desert Botanical Laboratory: see Carnegie Institution, Desert Botanical Laboratory.

Detroit. Commissioner of Parks and Boulevards, Detroit, Mich. *Annual Report.*

‡ Deutsche Botanische Gesellschaft, Berlin, Germany. *Berichte.*

‡ Deutsche Botanische Monatsschrift, Arnstadt, Germany.

Deutsche Dendrologische Gesellschaft, Poppelsdorf bei Bonn, Germany. *Mitteilungen.*

Dorpat: see Jurjeff.

Dublany. Hortus Botanicus Academicus: see Lemberg, Hortus Botanicus.

Dublin. Royal Botanic Gardens, Glasnevin, Dublin, Ireland. *Seed Lists.*

‡ Edinburgh Botanical Society, Edinburgh, Scotland. *Transactions.*

Edinburgh. Royal Botanic Garden, Edinburgh, Scotland. *Seed Lists.*

Eli Lilly and Company, Indianapolis, Ind.

Elisha Mitchell Scientific Society, Chapel Hill, N. C. *Journal.*

Eritrea: see Asmara.

Fauna: see Luxemburg, Société des Naturalistes Luxembourgeois.

* Fern Bulletin, Binghampton, N. Y.

Feuille des Jeunes Naturalistes, Paris, France.

Field Columbian Museum, Chicago, Ill. *Publications: Botanical Series, Report Series.*

† Flora, Marburg, Germany.

* Flora and Sylva, London, England.

Floral Life, Springfield, Ohio.

Florence. R. Orto Botanico, Florence, Italy. *Lavori.*

Florida. Report of the Commissioner of Agriculture, Jacksonville, Fla.

Florida State Horticultural Society, Tallahassee, Fla. *Proceedings.*

Florists' Exchange, New York, N. Y.

Flower Preservation Society of America, Washington, D. C. *Circulars.*

Forest and Stream, New York, N. Y.

Forestry and Irrigation, Washington, D. C.

Forestry Quarterly, Ithaca, N. Y.

† France. Société Botanique de France, Paris, France. *Bulletin.*

France. Société Dendrologique de France, Paris, France. *Bulletin.*

† France. Société Mycologique de France, Paris, France. *Bulletin.*

Frankfort on Main. Senckenbergische Naturforschende Gesellschaft, Frankfurt a/M., Germany. *Berichte.*

‡ Frankfort on Oder. Naturwissenschaftlicher Verein des Regierungsbezirkes, Frankfurt a/O., Germany. *Helios.*

† Garden, London, England.

‡ Garden Magazine, New York, N. Y.

† Gardener's Chronicle, London, England.

‡ Gardener's Chronicle of America, New York, N. Y.

Gardening, Chicago, Ill.

* Gartenflora, Munich, Bavaria, Germany.

* Gartenkunst, Berlin, Germany.

Geneva. Jardin d'Acclimitation Alpin, Genève, Switzerland. *Seed Lists.*

Geneva. Jardin Botanique de Genève, Genève, Switzerland. *Bulletin du Laboratoire Général*, *Annuaire.*

Geneva. Université de Genève, Laboratoire de Botanique, Genève, Switzerland. *Etudes.*

Georgia State Horticultural Society, Augusta, Ga. *Proceedings.*

Gray Herbarium: see Harvard University.

Grenoble. Jardin des Plantes de la Ville de Grenoble, Grenoble, France. *Seed Lists.*

Grenoble. Université de Grenoble, Jardins Botaniques Alpins, Grenoble, France. *Seed Lists.*

Groningen. Jardin Botanique de l'Université, Groningen, Holland. *Seed Lists.*

Hamburg. Naturwissenschaftlicher Verein, Hamburg, Germany. *Verhandlungen*, *Botanical papers from the Abhandlungen.*

Hamburgische Botanische Staatsinstitute, Hamburg, Germany. *Seed Lists.*

Hamilton Scientific Association, Hamilton, Ontario. *Journal and Proceedings.*

Hardwood Record, Chicago, Ill.

Harlem. Koloniaal Museum te Haarlem, Haarlem, Holland. *Bulletin.*

Hartley Botanical Laboratories: University of Liverpool, Liverpool, England. *Publications and Reprints.*

Harvard University, Cambridge, Mass. *Contributions from the Gray Herbarium*, *Contributions from the Cryptogamic Laboratory*, *Contributions from the Phanerogamic Laboratory.*

Havana. Jardin Botanico de la Universidad, Havana, Cuba.

Hawaii. Sugar Planter's Association Experiment Station, Honolulu, Hawaii. *Report*, *Bulletin.*

‡ Hedwigia, Dresden, Germany.

Helios: see Frankfort on Oder, Naturwissenschaftlicher Verein.

Helsingfors: Universitetets Botaniska Institution, Helsingfors, Finland. *Miscellaneous botanical reprints and papers.*

Hérault. Société d'Horticulture et d'Histoire Naturelle de l'Hérault, Montpellier, France. *Annales.*

* Herbier Bossier, Geneva, Switzerland. *Bulletin.*

Holland. Société Botanique Néerlandaise, Nijmegen, Holland. *Nederlandsch Kruidkundig Archief*, *Recueil des Travaux botaniques Néerlandais.*

Hooker's Icones Plantarum: see Icones Plantarum.

Hopkins Seaside Laboratory: see Leland Stanford Jr. University.

Horticulture, Boston, Mass.

Hortus Thenensis: see Tirlemont.

* House and Garden, Philadelphia, Pa.

Hull Botanical Laboratory: see Chicago University.

Hungary. Institut Central Ampélogique Royal Hongrois, Budapest, Hungary. *Annales.*

‡ Icones Plantarum, London, England.

Icones Selectae Horti Thenensis: see Tirlemont.

Illinois Farmer's Institute, Springfield, Ill. *Annual Report.*

Illinois State Department of Agriculture, Springfield, Ill. *Transactions.*

Illinois State Laboratory of Natural History, Urbana, Ill. *Bulletin.*

India. Botanical Survey of India, Calcutta, India. *Records.*

India. Department of Agriculture in India, Pusa, India. *Memoirs.*

India. Imperial Department of Agriculture, Calcutta, India. *Annual Report.*

India Rubber World, New York, N. Y.

Indian Museum Notes: see Calcutta, Indian Museum.

Indiana Academy of Science, Indianapolis, Ind. *Proceedings.*
Indiana Horticultural Society, Indianapolis, Ind. *Transactions.*
* International Catalogue of Scientific Literature: Botany, London, England.
International Society of Arboriculture, Connersville, Ind. *Arboriculture.*
Iowa Academy of Sciences, Des Moines, Ia. *Proceedings.*
Iowa Department of Agriculture, Des Moines, Ia. *Yearbook.*
Iowa Naturalist, Iowa City, Ia.
Iowa Park and Forestry Association, Iowa City, Ia. *Proceedings.*
Iowa State College of Agriculture and Mechanic Arts, Ames, Ia. *Contributions from the Botanical Department.*
Iowa State Horticultural Society, Des Moines, Ia. *Transactions.*
Iowa State University, Iowa City, Ia. *Bulletin of the Natural History Laboratories.*
‡ Italy. Società Botanica Italiana, Florence, Italy. *Bullettino, Nuovo Giornale Botanico Italiano, Bullettino Bibliografico.*
† Jahrbücher für Wissenschaftliche Botanik, Leipzig, Germany.
* Jahresbericht der Vereinigung der Vertreter der Angewandten Botanik, Berlin, Germany.
† Jahresbericht über die Fortschritte in der Lehre von den Pathogenen Mikroorganismen, Leipzig, Germany.
* Jahresbericht über die Neuerungen und Leistungen auf dem Gebiete der Pflanzenkrankheiten, Berlin, Germany.
Jamaica. Public Gardens and Plantations, Kingston, Jamaica. *Bulletin of the Department of Agriculture.*
Japan. Imperial Central Agricultural Experiment Station, Tokio, Japan. *Bulletin.*
Jardin Colonial: see Bulletin du Jardin Colonial et des Jardins d'Essai des Colonies Françaises.
Java. Proefstation voor Suikerriet in West Java, Dutch East Indies. *Mededeelingen.*
"Jevremovac": see Belgrade, Jardin Botanique "Jevremovac."
Johns Hopkins University, Baltimore, Md. *Circulars.*
* Journal d'Agriculture Tropicale, Paris, France.
† Journal de Botanique, Paris, France.
* Journal des Roses, Melun, France.
* Journal of Biological Chemistry, New York, N. Y.

‡ Journal of Botany, British and Foreign, London, England.
Journal of Geography, Columbia University, New York, N. Y.
Journal of Mycology, Columbus, Ohio.
Journal of Pharmacology, New York, N. Y.
Jurjeff. University, Jurjeff (Dorpat), Russia. *Acta Horti Botanici Jurjevensis.*
Kansas Academy of Sciences, Topeka, Kans. *Transactions.*
Kansas University Science Bulletin, Lawrence, Kans.
Karlsruhe. Botanischer Garten der Technischen Hochschule, Karlsruhe, Germany. *Seed Lists.*
Kew. Royal Gardens, Kew, England. *Bulletin of Miscellaneous Information.*
Kharkow. Société des Naturalistes de l'Université Impériale à Kharkow, Kharkow, Russia. *Travaux.*
* La Cellule, Lierre, France.
Landshut. Botanischer Verein, Landshut, Bavaria, Germany. *Berichte.*
Le Bambou, Mons, Belgium.
* Leaflets of Botanical Observation and Criticism, Washington, D. C.
* Le Botaniste, Poitiers, France.
Leland Stanford Jr. University: Hopkins Seaside Laboratory, San Francisco, Calif. *Contributions.*
Lemberg. Hortus Botanicus Academicus Dublanensis, Lemberg, Austria. *Seed Lists.*
Leyden. Ryks Herbarium, Leyden, Holland. *Annales du Musée.*
Leyden. University Botanic Garden, Leyden, Holland. *Seed Lists.*
Liège. Institut Botanique de l'Université, Liège, Belgium. *Archives.*
Lima. Sociedad Geografica de Lima, Lima, Peru. *Boletin.*
* Lindenia, Brussels, Belgium.
* Linnean Society, London, England. *Transactions: Botany, Journal: Botany.*
Lloyd Mycological Museum, Cincinnati, Ohio. *Report, Mycological Notes, Reproduction Series, Bulletin.*
London. Royal Colonial Institute, London, England. *Proceedings.*
* London. Royal Horticultural Society, London, England. *Journal.*

‡ London. Royal Microscopical Society, London, England. *Journal.*

"Lotos": see Prag, Deutscher Naturwissenschaftlich-medicinischer Verein für Böhmen: "Lotos."

Lund. Hortus Botanicus, Lund, Sweden. *Seed Lists.*

Luxemburg. Société Botanique du Grand Duché de Luxembourg, Luxembourg, Gd. Duché de Luxembourg. *Recueil.*

Luxemburg. Société des Naturalistes Luxembourgeois, Luxembourg, Gd. Duché de Luxembourg. *Fauna.*

Lyons. Jardin Botanique de la Faculté Mixte de Medecine et de Pharmacie, Lyons, France. *Seed Lists.*

Lyons. Jardin Botanique de la Ville, Lyons, France. *Seed Lists.*

‡ Lyons. Société Botanique de Lyon, Lyons, France. *Annales.*

McGill University, Montreal, Canada. *Papers from the Department of Botany.*

Macon. Société d'Histoire Naturelle, Macon, France. *Bulletin.*

Madrid. Horto Botanico, Madrid, Spain. *Seed Lists.*

Magyar Botanikai Lapok, Budapest, Hungary.

Maine. Report of the Agricultural Commissioner, Augusta, Me.

Malay Peninsula. Agricultural Bulletin of the Malay Peninsula, Singapore, Straits Settlements.

† Malpighia, Genoa, Italy.

Manchester Institute of Arts and Sciences, Manchester, N. H. *Proceedings.*

Manchester Museum, Owens College, Manchester, England. *Reports, Publications.*

* Marcellia, Avellino, Italy.

Marseilles. Institut Colonial, Marseilles, France. *Annales.*

Maryland Geological and Natural History Survey, Baltimore, Md.

Massachusetts Horticultural Society, Boston, Mass. *Transactions.*

Massachusetts State Board of Agriculture, Boston, Mass. *Annual Report.*

Mayflower, Floral Park, Long Island, N. Y.

Mazama, Portland, Oregon.

Mexico. Instituto Medico Nacional, Mexico, Mexico. *Anales.*

Michigan Academy of Science, Ann Arbor, Mich. *Report.*

Michigan Horticultural Society, Lansing, Mich. *Annual Report.*

Michigan. Report of the Secretary of State relating to Farms and Farm Products, Lansing, Mich.

Michigan. State Board of Geological Survey of Michigan, Lansing, Michigan. *Report.*

Michigan State Farmers' Institutes, Agricultural College, Mich. *Bulletin.*

Minnesota. Geological and Natural History Survey, Minneapolis, Minn. *Bulletin*, *Report.*

Minnesota Horticultural Society, Minneapolis, Minn. *Transactions.*

‡ Minnesota Horticulturist, Minneapolis, Minn.

Miramichi. Natural History Association of Miramichi, Chatham, N. B. *Proceedings.*

Missouri Botanical Garden, St. Louis, Mo. *Report.*

Missouri State Fruit Experiment Station, Mountain Grove, Mo. *Bulletin*, *Report.*

Missouri State Horticultural Society, Jefferson City, Mo. *Annual Report.*

Modena. R. Orto Botanico, Modena, Italy. *Seed Lists.*

† Monatsschrift für Kakteenkunde, Neudamm, Germany.

Moniteur du Caoutchouc, Bruxelles, Belgium.

Montana Agricultural College Science Studies: Botany, Bozeman, Mont.

Montana. University of Montana, Missoula, Mont. *Bulletin: Biological Series.*

Montevideo. Museo Nacional, Montevideo, Uruguay. *Anales.*

Montpellier. Institut de Botanique, Montpellier, France. *Seed Lists.*

Moscow. Institut Agronomique, Moscow, Russia. *Annales.*

Moscow. Société Impériale des Naturalistes, Moscow, Russia. *Bulletin.*

Muhlenbergia, Los Gatos, Calif.

Munich. Königlicher Botanischer Garten, Munich, Bavaria. *Seed Lists.*

Musée Teyler, Haarlem, Holland. *Archives.*

Naples. Società di Naturalisti in Napoli, Naples, Italy. *Bollettino.*

Natal Botanic Gardens and Colonial Herbarium, Durban, Natal. *Report.*

Naturalist (The), Hull, England.

* Nature, London, England.

Nature Notes: The Magazine of the Selborne Society, London, England.

Nature Study Review, New York, N. Y.

Nebraska State Horticultural Society, Lincoln, Neb. *Annual Report.*

Nebraska. University of Nebraska, Lincoln, Neb. *Contributions from the Botanical Department.*

Nederlandsch Kruidkundig Archief: see Holland, Société Botanique Néerlandaise.

New Brunswick. Natural History Society of New Brunswick, St. John, N. B., Canada. *Bulletin.*

New England Botanical Club: see Rhodora.

New Hampshire. Board of Agriculture, Manchester, N. H. *Annual Report.*

New Jersey State Board of Agriculture, Trenton, N. J. *Annual Report.*

New Jersey State Horticultural Society, Trenton, N. J. *Proceedings.*

New Orleans. Audubon Park, New Orleans, La. *Yearbook.*

* New Phytologist, London, England.

New South Wales. Linnean Society, Sydney, N. S. W. *Proceedings.*

New York Academy of Sciences, New York, N. Y. *Annals.*

New York. Art Commission, New York, N. Y. *Annual Report.*

New York Farmers, New York, N. Y. *Proceedings.*

New York. Forest, Fish and Game Commission, Albany, N. Y. *Annual Report.*

New York Horticultural Society, New York, N. Y. *Report, Memoirs, Journal.*

New York. Municipal Art Society, New York, N. Y. *Bulletin.*

New York Public Library, New York, N. Y. *Bulletin.*

New York State Department of Agriculture, Albany, N. Y. *Annual Report.*

New York State Museum of Natural History, Albany, N. Y. *Annual Report.*

New York. The City Club of New York, New York, N. Y. *Annual Report.*

New York. Tree Planting Association of New York City, New York, N. Y. *Circulars.*

New York Zoölogical Society, New York, N. Y. *Report, News Bulletin.*

Nova Scotia. Secretary for Agriculture, Halifax, N. S., Canada. *Annual Report.*

Nova Scotian Institute of Science, Halifax, Canada. *Proceedings, Transactions.*

Nuova Notarisia, Padua, Italy.

Nuovo Giornale Botanico Italiano: see Italy, Società Botanica Italiana.

Nürnberg. Naturhistorische Gesellschaft, Nürnberg, Germany. *Abhandlungen.*

Nyt Magazin: see Christiania, Physiographiske Forening.

Oberlin College, Oberlin, Ohio. *Laboratory Bulletin.*

Ohio Mycological Bulletin: see Ohio State University.

Ohio Naturalist: see Ohio State University, Biological Club.

Ohio State Academy of Science, Columbus, Ohio. *Proceedings.*

Ohio State Board of Agriculture, Columbus, Ohio. *Annual Report.*

Ohio State University, Columbus, Ohio. *Bulletin: Botanical Series, Ohio Mycological Bulletin.*

Ohio State University: Biological Club, Columbus, Ohio. *Ohio Naturalist.*

Olmütz. Botanischer Garten, Olmütz, Austria. *Seed Lists.*

* Orchid Review, London, England.

Oregon State Board of Horticulture, Salem, Oregon. *Report.*

† Österreichische Botanische Zeitschrift, Vienna, Austria.

Ottawa. Central Experiment Farm, Ottawa, Canada. *Bulletin, Report.*

Ottawa Naturalist, Ottawa, Canada.

Palermo. R. Istituto ed Orto Botanico, Palermo, Italy. *Bollettino, Contribuzioni alla Biologia Vegetale.*

Paris. Muséum d'Histoire Naturelle, Paris, France. *Bulletin.*

Paris. Société Linnéenne de Paris, Paris, France. *Bulletin Mensuel.*

Park and Cemetery, Chicago, Ill.

Pennsylvania Botanical Society, Philadelphia, Pa. *Proceedings.*

Pennsylvania Department of Forestry, Harrisburg, Pa. *Report.*

Pennsylvania Forestry Association, Philadelphia, Pa. *Forest Leaves.*

Pennsylvania. University of Pennsylvania, Philadelphia, Pa. *Contributions from the Department of Botany.*

Peradeniya. Royal Botanic Gardens, Peradeniya, Ceylon. *Annals.*

Pharmaceutical Review, Milwaukee, Wis.

Philadelphia. Academy of Natural Sciences, Philadelphia, Pa. *Proceedings.*

Philadelphia Commercial Museum, Philadelphia, Pa. *Publications.*

Philadelphia Geographical Society, Philadelphia, Pa. *Bulletin.*

Philippine Islands. Bureau of Agriculture, Manila, Philippine Ids. *Report*, *Bulletin*, *Farmers Bulletin*, *Press Bulletin.*

Philippine Islands. Bureau of Science, Manila, Philippine Ids. *Philippine Journal of Science.*

‡ Pittonia, Washington, D. C.

Plant World, New York, N. Y.

Popular Science Monthly, New York, N. Y.

Portici. R. Scuola Superiore di Agricoltura, Portici, Italy. *Annali.*

Portland Society of Natural History, Portland, Me. *Proceedings.*

Prag. Deutscher Naturwissenschaftlich-medicinischer Verein für Böhmen: "Lotos," Prag, Bohemia, Austria. "*Lotos.*"

Preservation of Native Plants: see Society for the Preservation of Native Plants.

Providence. Park Commissioners, Providence, R. I. *Annual Report.*

Queen College Library, Kingston, Ontario, Canada.

Regensburg. Kgl. Botanische Gesellschaft, Regensburg, Bavaria, Germany. *Denkschriften.*

* Repertorium novarum specierum regni vegetabilis, Berlin, Germany.

Revista de la Facultad Nacional de Agronomia y Veterinaria, La Plata, Argentine Republic.

* Revista de Montes, Madrid, Spain.

Revue Bryologique, Cahan, Athis, France.

* Revue de l'Horticulture Belge et Etrangère, Ghent, Belgium.

Revue des Cultures Coloniales, Paris, France.

† Revue Générale de Botanique, Paris, France.

* Revue Horticole, Paris, France.

‡ Revue Mycologique, Toulouse, France.

Revue Scientifique du Bourbonnais et du Centre de la France, Moulins, France.

* Rhodora, Boston, Mass.

Rio de Janeiro. Museu Nacional do Rio de Janeiro, Rio de Janeiro, Brazil. *Archivos.*

Rochester Academy of Sciences, Rochester, N. Y. *Proceedings.*

Rome. R. Istituto Botanico, Rome, Italy. *Annuario*, *Annali di Botanica.*

Rome. R. Stazione Agraria Sperimentale, Rome, Italy. *Bolletino.*

Royal Gardens, Kew: see Kew, Royal Gardens.

Royal Horticultural Society: see London, Royal Horticultural Society.

Royal Microscopical Society: see London, Royal Microscopical Society.

Rural New Yorker, New York, N. Y.

St. Louis. Academy of Science, St. Louis, Mo. *Transactions.*

St. Petersburg. Académie Impériale des Sciences, St. Petersburg, Russia. *Travaux du Musée Botanique.*

St. Petersburg. Institut et Jardin Botanique de l'Université Impériale, St. Petersburg, Russia. *Scripta Botanica*, *Seed Lists.*

† St. Petersburg. Jardin Impérial Botanique, St. Petersburg, Russia. *Acta*, *Bulletin*, *Seed Lists.*

Santa Barbara Society of Natural History, Santa Barbara, Calif. *Bulletin.*

Santiago de Chile: see Chili, Museo Nacional.

Saone-et-Loire. Société des Sciences Naturelles de Saone-et-Loire, Chalon-sur-Saone, France. *Bulletin.*

São Paulo. Sociedade Scientifica de São Paulo, São Paulo, Brazil. *Revista.*

Scafati. R. Istituto Sperimentale di Scafati, Salerno, Italy. *Bollettino Tecnico.*

Schlesische Gesellschaft für Vaterländische Cultur, Breslau, Germany. *Jahresbericht.*

Schweizerische Botanische Gesellschaft, Bern, Switzerland. *Berichte.*

Science, New York, N. Y.

Scientific Roll, London, England.

Selborne Society: see Nature Notes.

Senckenbergische Naturforschende Gesellschaft: see Frankfurt.

Sharon Biological Laboratory, Sharon, Mass.

Shaw School of Botany: see Washington University.

Siena. R. Orto Botanico, Siena, Italy. *Bollettino.*

Singapore. Botanic Gardens, Singapore, Straits Settlements. *Annual Report.*

Smith College, Northampton, Mass. *Seed Lists.*

Smithsonian Institution, United States National Museum, Washington, D. C. *Report.*

Sociedad Broteriana, Jardin Botanico, Coimbra, Portugal. *Boletim.*

Sociedad Cientifica "Antonio Alzate," Mexico, Mexico. *Memorias y Revista.*

Sociedad Nacional de Agricultura, Rio Janeiro, Brazil. *A Lavoura.*

Societas pro Fauna et Flora Fennica, Helsingfors, Finland. *Acta*, *Meddelanden.*

Society of American Florists: see America.

Society for the Preservation of Native Plants, Boston, Mass. *Leaflets.*

* Society for the Promotion of Agricultural Science. *Proceedings.*

Southern California Academy of Sciences, Los Angeles, Cal. *Bulletin.*

Springfield. Museum of Natural History, Springfield, Mass. *Bulletin.*

Springfield. Pleasure Driveway and Park District, Springfield, Ill. *Annual Report.*

Staten Island. Natural Science Association of Staten Island, New Brighton, S. I., N. Y. *Proceedings.*

Stockholm. Bergianska Trädgården: see Bergianska Trädgården.

Stockholm. Kongliga Vetenskaps-Akademien: see Sweden.

Stockholm. Högskolas Botaniska Institut, Stockholm, Sweden. *Meddelanden.*

Sweden. Kongliga Svenska Vetenskaps-Akademien, Stockholm, Sweden. *Archiv för Botanik.*

Swanley. Horticultural College, Swanley, England. *Report.*

Sydney. Botanic Gardens, Sydney, New South Wales. *Report.*

Sydney. Technological Museum, Sydney, New South Wales. *Publications.*

Texas Academy of Science, Austin, Texas. *Transactions.*

Texas. University of Texas, Austin, Texas. *Contributions from the Botanical Laboratory.*

The Agricultural Ledger: see Agricultural Ledger.

The Iowa Naturalist: see Iowa Naturalist.

Thüringischer Botanischer Verein, Weimar, Germany. *Mittheilungen.*

Tiflis. Jardin Botanique, Tiflis, Russia. *Travaux*, *Moniteur.*

Tirlemont. Hortus Thenensis, Tirlemont, Belgium. *Icones Selectae, Plantae Novae.*

Tōkyō Botanical Society, Tōkyō, Japan. *Botanical Magazine.*

Tōkyō. Imperial University, Botanic Garden, Tōkyō, Japan. *Seed Lists.*

Tōkyō. Imperial University, College of Agriculture, Tōkyō, Japan. *Bulletin.*

Toronto. University of Toronto, Toronto, Canada. *Studies, Biological Series.*

Torrey Botanical Club, New York, N. Y. *Bulletin, Memoirs, Torreya.*

Trajectum: see Utrecht.

Triest. Museo Civico di Storia Naturale Ferdinando Massimiliano, Triest, Austria. *Seed Lists.*

‡ Trinidad. Royal Botanic Gardens, Trinidad, W. I. *Bulletin of Miscellaneous Information.*

Tromsø Museum, Tromsø, Norway. *Aarshefter.*

United States Departmeut of Agriculture, Washington, D. C. *All publications.*

United States Department of Commerce and Labor, Washington, D. C. *Monthly Consular and Trade Reports.*

United States Geological Survey, Washington, D. C. *Bulletin, Annual Report, Monographs, Professional Papers.*

United States National Museum: see Smithsonian Institution, United States National Museum.

Upsala. Kgl. Universität, Upsala, Sweden. *Botanical reprints, Seed Lists.*

Upsala. Regia Societas Scientiarum Upsaliensis, Upsala, Sweden. *Nova Acta.*

Utrecht. Hortus Botanicus Universitatis Rheno-Traiectinae, Utrecht, Holland. *Seed Lists.*

Valais. La Murithienne, Société Valaisanne des Sciences Naturelles, Sion, Valais, Switzerland. *Bulletin.*

Valencia. Universidad Literaria de Valencia, Valencia, Spain. *Seed Lists.*

Vermont Botanical Club, Burlington, Vt. *Bulletin.*

Vermont State Board of Agriculture, Burlington, Vt. *Annual Report.*

Vick's Illustrated Monthly Magazine, Rochester, N. Y.

Victoria. Field Naturalists' Club of Victoria, Melbourne, Australia. *The Victorian Naturalist.*

died during the succeeding winter, proving unsuited to our climate, and so were lost to the collections. This has reduced the representation in the herbaceous collections to about 2,200 species and varieties. This weeding out of duplicates in the herbaceous grounds has provided considerable room, and it would seem advisable during the coming year to incorporate in this collection as large a representation as possible of the flora of the eastern United States; additional local interest would be added to the collection by adopting a designative label for such plants. All the plants in the herbaceous grounds, the names of which have been verified, have now been supplied with show labels. During the past year 662 such labels were added.

Morphological Garden. The collections here remain about as last year. Such specimens as failed have been replaced, and two other species added, making a total of 118 specimens. Show labels for all of these have been supplied, the work being completed by the addition of 39 during the past year.

Economic Garden. The northern end of the valley in which are located the morphological garden and the herbaceous grounds has been selected as a site for this collection. Ground was broken here during the past fall, and a beginning made in the installation of plants. There were placed in position 16 species of shrubs and trees, represented by 19 specimens. This work will be actively prosecuted during the spring.

Fruticetum. The collections here have been increased by the addition of 103 species, these having been transferred in the main from the nurseries, with a few purchases. There are now 630 species and varieties in the fruticetum, with an additional 53 still in the nursery, not yet in condition for transferral. There are contained in the collections here 1,272 specimens, an increase of 261 over last year. The completion of the paths in the neighborhood of the Scott Avenue bridge approach permitted of the resumption of the planting in that vicinity. The ginseng, mezereon, white alder, heath and huckleberry families, intended for this region, were

therefore installed. Later studies of the path system of the northern end of this tract west of the driveway made necessary some rearrangement of the families there. This affected the dogwood, holly, staff-tree, bladder-nut, and soapberry families, but the changes were effected with a minimum of transplanting. There have been 660 show labels placed in position here during the year, thus providing for considerably over half of the verified material.

Salicetum. There has been no change made here. The collections contain 45 species and varieties, represented by 125 specimens.

Deciduous Arboretum. This collection embraces 251 species and varieties, including those still in the nurseries and native to the tract, an increase of 2 species. In the arboretum alone there are at present 381 specimens, an increase of 18 over the number of last year.

Pinetum. Considerable planting has been done here during the year. Including those still at the nurseries, as yet too small for transferral, there are now 260 species and varieties embraced in this collection. Of these 179 are in the pinetum itself, represented by 737 specimens, a gain of 20 species and 117 specimens over the previous year. Much of the material incorporated was from the rich collections of Mr. Lowell M. Palmer, whose continued generosity has greatly increased the value of this collection. With the exception of a few plants, the identifications of which are still uncertain, all the specimens in the pinetum have been supplied with show labels, of which 674 have been placed in position during the year.

The region to the westward of the morphological garden being more protected from the cold winds, it was decided to move there the collection of yews, located for some time on the more exposed ridge to the west of the herbaceous grounds. This was completed during the spring.

Viticetum. Active work was again commenced in this tract. To the species here last year 13 have been added, making the number now 50 species, represented by 96 speci-

mens. It is intended to develop this collection further during the coming year.

Conservatories. No change has been made in the general arrangement of the collections here installed. The crowded condition in several of the houses has made necessary some rearrangement in certain cases. Owing to the increase in size of many of the specimens in the palm collection in the large central dome, more space became very desirable. This desire was satisfied by disposing of some of the larger duplicates by exchange, and by removing a number of specimens of several of the temperate species into no. 13, one of the houses devoted to the temperate collections. This rearrangement has greatly improved the appearance of the collection of palms, permitting a better display of individual specimens and showing the graceful beauty of their trunks and foliage, features in which the public is much interested. A number of specimens in nos. 7 and 8 having become too large for those houses, it became imperative to transfer them to no. 4, thus making necessary a rearrangement of that house to accommodate them. In house no. 13 a group has been made, in the northwest corner, of the palms removed from the dome and of some of the tree-ferns from temperate regions taken from house no. 11. This has greatly improved the character and appearance of the collections in that house, as the extension of these plants into the temperate flora is thus indicated.

There have been placed in the conservatories during the year 2,106 show labels. There are now in these collections, including those temporarily at the propagating houses, 7,761 species and varieties, representing 1,347 genera and 204 families. The total number of plants in the conservatories is 8,617, the number in each house being indicated in the following table:

House No. 1	220	House No. 4	329
2	601	5	1,480
3	320	6	660

House No. 7	783	House No. 12	830
8	706	13	445
9	125	14	620
10	486	15	777
11	235		

Propagating Houses and Nurseries. The study collection of cactuses has now grown so large that it has been necessary to assign to it additional space, and therefore a large part of no. 6, in addition to no. 5, is devoted to it. As in past years, house no. 4 has been set aside for the use of the Director of the Laboratories and the students under his direction. Portions of the nurseries have also been reserved for such uses.

Packets of seed to the number of 230 have been received from outside sources. During the year 190 packets of seed have been collected in the various plantations, mostly annuals, to safeguard the collections.

There are now in the propagating houses, excluding those in no. 4, 7,324 plants and 90 seed pans. In the cold frames there are 591 plants. Many duplicates were disposed of during the past year to make room for the collections brought in by the Garden expeditions.

In the nurseries there are 1,164 specimens of deciduous trees and shrubs; 880 specimens of conifers; and 2,000 specimens of herbaceous plants.

Labeling, Recording and Herbarium. As was the case last year, the details of this work have been carried out under the direction of two garden aids. Mr. Norman Taylor has had charge of the tender collections and of the work on the card catalogue. Mr. W. W. Eggleston has had under his direction the hardy collections, the work of accessioning, and the preparation of show labels.

In this work have been employed three or four apprentices under the immediate direction of the garden aids. One of these has attended to the collecting of seeds, the making of herbarium specimens of the hardy collections and the drying and mounting of all specimens made from the cultivated

plants, and the entries and corrections necessary in the card catalogue and in the accession book; he has also performed a lot of miscellaneous duties, including those of guide and usher at the nature-study lectures. In the work of label-making two apprentices for the entire time and a third for about two thirds of the time have been employed; these also acted as guides at the nature-study lectures.

In addition to the above I have had the use of one garden aid for a part of the time during the latter half of the year. He has aided Mr. Eggleston in his work on the herbaceous collections and in placing show labels in the hardy collections, and in other miscellaneous duties; his services were also employed in demonstration work in the nature-study lectures.

The following labels have been manufactured and placed in position during the past year, a total of 4,455:

Herbaceous Grounds	662
Morphological Garden	39
Conservatories	2,106
Experimental Grounds at Nurseries	129
Pinetum	674
Fruticetum	660
Trees along road and paths	185

The amount of work turned out by the labelers, with a force about equal to that of the previous year, is considerably in excess of that accomplished during 1905. This gain was the result primarily of transferring the labelers from the propagating houses to the museum, and of placing the work under the immediate direction of one of the apprentices. While the number of labels is not quite equal to that of 1905, the character of the labels manufactured must be taken into consideration. This past year over 1,500 of the labels have been of the type with lead face, wooden back and wire supports. This style of label requires in its manufacture over twice the time necessary for any of the other styles. The number of this style made in 1905 was 68. I estimate that fully twenty per cent. more work has been accomplished than in the previous year.

Accession numbers 24,513–26,034 have been recorded during the year, making a total of 1,522 accessions. The total number of plants derived from all sources has been 4,266, of which 774 were purchased, 724 donated, 768 collected, 726 acquired by exchange, and 1,274 derived from seeds.

The herbarium of cultivated plants has been increased by 2,030 specimens; of these 1,080 were from the conservatories and 950 from the outside collections.

In the following table will be found the approximate number of species and varieties in each collection:

Conservatories	7,761
Herbaceous Grounds	2,200
Fruticetum	683
Deciduous Arboretum	251
Pinetum	260
Salicetum	45
Viticetum	50
	11,250

Growing wild within the grounds there are about 860 species in addition to the above.

General Horticultural Operations

The details of this work were carried out by the second gardener, Mr. George A. Skene, until the time of his resignation on October 26. For the remainder of the year this work, in its relation to the outside collections, has been prosecuted expeditiously and with gratifying results by Mr. John Finley, hitherto one of the foremen employed on the construction work, but evidently having considerable experience in the care of hardy plants. The force employed in this general horticultural work was made up as follows: one foreman gardener, 17 gardeners (of which 2 were dispensed with in October), 7 apprentices (of which 2 were dispensed with on October 31), and 14 or 15 laborers. In addition to this 1 driver for his entire time and 3 additional ones during

the mowing season were assigned to this department for hauling and mowing purposes. In addition to their other duties, 1 of the gardeners and 5 of the apprentices have acted in the capacity of guides during the afternoons, both spring and fall, on which nature-study lectures occurred.

Of the above force, 1 foreman gardener, 9 gardeners, and 6 apprentices (2 of which were dispensed with on October 31) were detailed to the conservatories; 3 gardeners and 1 apprentice to the propagating houses, being 1 apprentice less than last year; and 5 gardeners and the laborers to the outside work.

The area to be maintained by the outside force was again divided into tracts, designated as follows: museum, conservatory, west border, fruticetum, and herbaceous grounds. Each tract was put in the care of a gardener who was held responsible for its appearance. In addition to the gardener in charge, the laborers were assigned to the various tracts as follows: conservatory 3; west border 3; herbaceous grounds 4; fruticetum 2; and museum 3 (only 2 for a part of the time). The deciduous arboretum was maintained by special details from the other tracts. In the fall, as soon as gardening operations in the plantations were unnecessary, the gardeners were employed in the usual leaf-raking, top-dressing, and other work of a similar nature.

In decorative planting there were used about 801 specimens. Of these 610 were secured by purchase, 70 by gift, and 121 were transferred from the nurseries. To the herbaceous collections in the west border were added 125 plants. The gap existing in the west border just to the westward of the lakes was closed with a miscellaneous collection of woody plants, consisting of shrubs and trees, among the latter being many pines. The border at the Scott Avenue approach was also rearranged, and enlarged by the addition of rhododendrons, azaleas, pines and other trees. A portion of one of the triangles near the herbaceous grounds was planted with dogwood. To the southeast of the conservatories, on the bank between the path and driveway, were placed two beds of

Rosa rugosa. The area in front of the south post at the Southern Boulevard entrance was planted with 15 plants of *Rosa rugosa*, to make it correspond with the other post.

Along the driveways and paths 47 trees have been planted, including a row of 20 of the maiden-hair tree, placed between the west path and the driveway past the west end of the lakes. With the exception of those planted the past fall and a few not yet satisfactorily identified, all the recently planted trees along the driveways and paths have been furnished with stake show labels. There have been 185 of these placed in position the past year.

Investigations

Mr. Taylor and Mr. Eggleston have both acted as demonstrators in the courses of nature-study lectures given both in spring and fall. Mr. Taylor has been employed, in addition to his other duties, in working up the conservatory collections, with the exception of the monocotyledons. He is gaining a knowledge of plant families and of cultivated plants and their literature which makes his services of increasing value. Mr. Eggleston has been engaged in working up the herbaceous collections, and in work upon the genus *Crataegus*.

In addition to the executive duties of my department, I have done much work upon the conservatory collections, confining myself in the main to the monocotyledons, especially to the orchids and bromeliads, of which families many specimens have been brought in by Garden expeditions. That Mr. Eggleston might not be interrupted in his work on herbaceous plants, I assumed the immediate direction of the making of show labels for the fruticetum, the pinetum, and for the trees along the roads and paths. I have also continued my studies upon the grasses of North America. Of the nature-study lectures given during the year, I delivered three in the spring and five in the fall.

George V. Nash,
Head Gardener.

REPORT OF THE SUPERINTENDENT OF GROUNDS

To the Director-in-Chief.

Sir: I have the honor to present the following as my report for the year 1906.

Construction of Roads

Work was resumed on January 2 on the Mosholu Parkway approach connecting this driveway with the driveways of the Garden, where 3,200 cubic yards of loam had been filled in in 1905, and the fill was completed up to the grade. The walks were covered with 3 feet of ashes obtained from the power house, and the grass plot with three feet of top soil hauled from the north of the museum building and from building lots outside of the Garden. On May 3 the subgrade was completed, with 4,261 cubic yards of fill, the necessary stone having been quarried north of the museum building.

The driveway from the N. Y. C. &. H. R. R. R. station to the plaza north of the lakes connecting with the Mosholu approach having been left in an unfinished condition owing to the inclemency of the weather in November, 1905, was surfaced, screened where it was found necessary, and the approach and said road were rolled and entirely completed. This driveway is 1,855 feet in length and 40 feet in width. Owing to the delay in setting lamp posts, the road and approach were not thrown open to the public until August 27.

Work was begun in May upon the continuation of the above driveway from the crossing north of the lake over the five-arched bridge to the plaza near the stable, stone having been hauled from the quarry in winter, and it was completed August 15. After lamp posts were put up, the road was opened September 2, this portion measuring 1,050 feet in length and 40 feet in width.

The Woodlawn Avenue bridge approach, after retaining wall and steps for walks were constructed and also partly

filled by contract work, was taken up in April and 2,334 cubic yards of fill were hauled from building lots outside of the Garden grounds to complete the grade. The road was paved and surfaced and, after 4 lamp posts were put up, it was opened December 8; it measures 400 feet in length by 30 in width. A fence 5 feet in height has been constructed of heavy locust and cedar wood for protection on the north side of this approach. This opened in all 3,305 feet of new road in the year 1906.

Work was resumed on the unfinished road east of and parallel with the river, on December 3, and paving has been completed for a distance of 400 feet.

Building of Paths

At the opening of spring additional paths were laid out in the fruticetum and north meadows. For a distance of 600 feet, beginning at a point near the road crossing north of the lakes to the stone steps of the Woodlawn Avenue bridge approach, partly built in 1905, these paths have been surfaced and completed. In addition to these, 1,100 feet west of the main driveway, 700 feet east and parallel with the driveway leading north and east to the long bridge, 1,200 feet around the north shore of the lakes, and 525 feet south of the lakes, and west and east and parallel with the main road, have been graded and paved with soft rock and broken stone; not including the 700 feet paved in 1905.

The extension of a path measuring 750 feet leading from the long bridge in a northerly direction and then curving in a semicircle and connecting opposite the foot of the Woodlawn Avenue bridge approach has been graded and curbstones laid. This will be paved or filled in with soft stone during the winter months.

The path 700 feet in length east of the main road opposite the museum building, leading in an easterly direction to the arbor, which was in progress of construction in 1905, has been totally paved and covered with soft rock. Connecting with this, a new line has been laid out leading in a southerly

direction over the high ground of the morphological garden, of which 850 feet are completely graded and paved, and the stone broken. This amounts to 6,525 feet in length by 11 feet in width prepared for surfacing as soon as screenings can be obtained.

The old trail continuing the path north and parallel with the driveway on the herbaceous grounds and leading through the hemlock grove to the foot bridge near the Lorillard mansion has been graded, paved and surfaced. This path is 11 feet in width and 250 feet in length. Cedar posts and rails have been put in the ground to prevent driving over it.

Regulating and Grading

The regulating of the terraces along the retaining walls north and south at the Mosholu bridge approach was undertaken early in the spring, when they were filled with good earth and surfaced with one foot of top soil and completed for planting. The slope on the border line along the N. Y. C. & H. R. R. R. west of the lake 350 feet in length and on an average of 50 feet in width was filled with 598 yards of earth and topsoil, regulated, the edges of the path sodded and sown, and trees and shrubs planted on it in April. The terrace against the retaining wall at the Woodlawn Avenue bridge approach has been built of earth and topsoil, and completely sodded, the sod having been obtained from grading paths east of the main road.

The slope between the main road and the path south and west of the foot of the Woodlawn Avenue approach, measuring 400 feet in length, 35 feet in width, and 300 feet between road and path east of the main road, has been partly regulated, sodded, and sown. The areas just north of the Lake bridge to the right and to the left of the road and between the lake and road west of the bridge about 400 feet by 75, together with the paths leading to the "blue bridge," have been regulated and the edges sodded. Owing to the bad weather in the autumn, sowing had to be postponed until spring. The curved slope south of said path about 100 by 15 feet has been graded and entirely sodded.

Great improvements in grading have been almost completed on an area measuring about 500 by 300 feet at the northern part of the morphological garden. Foundations of houses and barns destroyed years ago have been excavated, the plots have been filled in with earth, covered with top-soil, and the grounds entirely graded. A blind drain about 400 feet in length has been excavated, and the stone obtained from it has been used to construct an open drain 3 feet in width and 280 feet in length, extending to the natural flow on the herbaceous grounds and to pave the path mentioned in the foregoing paragraph. This work could not be completed on account of frost in November.

Owing to the washing out of the roads constructed three and four years ago, it was found to be necessary to regrade edges and grass gutters 2,900 feet long and 3 feet in width. The sods have been lifted and the grade lowered and relaid. Other minor crossings of paths have been regulated and graded.

Drainage

In order that drainage operations might keep pace with the improvements in grading, it was necessary to construct thirteen additional catch basins at the following low points: one at the junction of the paths east of the main road opposite the museum building, two on Mosholu bridge approach, one near the border line of the N. Y. C. & H. R. R. R. west of the lake, four north and south of the lake bridge, one just south of Woodlawn Avenue bridge approach, and two along the road east of the river. Two dry wells were also dug on small triangular grass plots, and 560 feet of 6- and 8-inch pipe were used to drain these basins to the main sewer or lakes. Special care was taken of surface drainage in connection with regulating; and along the edges of all the new completed roads and paths, the gutters have been sodded. All the basins have been examined and cleaned where it was found necessary.

Stable, Horses and Vehicles

The roof of the barn having been found to be in a defective condition, this building was repaired throughout; new shingles and metal gutters have been put on where it was found necessary, and the entire shingle covering has been stained with creosote paint. The doors, window-frames, gates and picket-fence inclosing the yard have been painted, the floor has been repaired and an additional stall constructed. There has been no serious sickness of horses to record. The hay crop produced 20 tons; about 6 tons more than in 1905. The fodder is of good quality and enough to last until October. One new horse, a single spring wagon and one cart harness were bought. Certain repairs of harness and carts had to be made outside, but all small repairs on carts, wagons, ploughs and other agricultural machinery were attended to by our blacksmith. The haymaking machines are in good condition except the field-mowers, which need to be thoroughly repaired. The expense for oats, straw, bran and salt amounts to $749.57, and for bought hay $65.08.

Miscellaneous

Early in the season the Park Department assigned two roadmen, and in June two sprinkling wagons for the maintenance of the driveways and the service road along the south border of the Garden; but with 3,300 feet additional roads opened, this service will prove to be insufficient.

The enormous increase in the number of visitors in comparison with previous years made it necessary to employ two extra guards on Sundays and holidays, but with the improvement of the grounds, especially in the fruticetum and the morphological garden, the present number appears to be insufficient for the proper guarding of the grounds.

Our special guards and the police made 35 arrests for violation of Park and Garden rules, mostly for breaking cultivated blossoms or destroying shrubs and small trees; and in 32 cases a fine from one to ten dollars was imposed by the police court magistrates.

Additional guard rails 18 inches in height were set up in the spring on the edges and curves of certain paths to the extent of 851 feet. Ten new signs for the instruction of the public regarding the rules of the Garden were erected near the gates and at other important points. The garden benches were removed from the grounds in November, and stored in the cellar of the conservatories. No new ones have been built during the year.

Having been ordered to supervise outdoor gardening from the first of September, I have made an inventory and inspection of all the machinery and tools in use. I found in the basement of the conservatories two horse lawn-mowers, two Side-far mowers, 14 hand mowers and 137 small tools of different descriptions, mostly used for outdoor work, and 63 pieces of the same kind in the propagating houses. The tools and small machinery not in use at present are all stored in the tool-house under the elevated railway approach. All the hand mowers and 2 of the horse mowers need thorough repairing.

The roots of all young trees and shrubbery have been securely covered for the winter. Young trees and shrubs have been planted under the direction of the head gardener, on new improved areas, as late as the weather in December permitted. The small number of outdoor gardeners now in employ are at work removing dead trees.

In the power-house the mason and stonecutter were working for five days making repairs, under the supervision of the chief engineer. Minor repairs, such as glazing and painting, have been made in the conservatories.

Respectfully submitted,

F. A. Schilling,

Superintendent of Grounds.

SCHEDULE OF EXPENDITURES DURING 1906, UNDER APPROPRIATIONS MADE BY THE BOARD OF MANAGERS

1. City Maintenance Account		$80,000.00
Salaries		
Appropriated	$62,870.01	
Expended	62,870.01	
Supplies and Repairs		
Appropriated	$17,129.99	
Expended	17,129.99	
Total Expended		80,000.00
2. Construction and Equipment		$32,002.64
Salaries and Labor		
Appropriated	$27,232.73	
Expended	27,232.73	
Sundry Expenses		
Appropriated	$4,769 91	
Expended	4,769.91	
Total Expended		32,002.64
3. Garden Accounts		
Assistance for Treasurer		
Appropriated	$150.00	
Transferred from Horticultural Prizes	30.00	180.00
Expended		180.00
Circulars for Membership		
Appropriated		$700.00
Expended	$446.91	
Transferred to Stable Equipment	250.00	696.91
Balance		3.09
Contingent Fund		
Appropriated	$2,500.00	
Refund — Expressage overpaid	.35	
Transferred from Horticultural Prizes	100.00	
Transferred from Purchase of Plants	100.00	

Transferred from Laboratories	125.00	
Transferred from Special Assistance	50.00	
Transferred from Publications	25.00	2,900.35
Expended		2,900.08
Balance		.27

Editorial Assistance

Appropriated.		$720.00
Expended		720.00

Expenses of Consulting Chemist

Appropriated		$300.00
Expended		300.00

Exploration and Collecting

Appropriated	$3,000.00	
Refunds — unexpended balances	115.98	3,115.98
Expended		3,115.68
Balance		.30

Horticultural Prizes

Appropriated	$400.00	
Refunds — Expressage overpaid	5.05	405.05
Expended	193.97	
Transferred to Contingent Fund	100.00	
Transferred to Assistance for Treasurer	30.00	
Transferred to Photography	25.00	
Transferred to Stable Equipment	55.00	403.97
Balance		1.08

Income of Lydig Fund (Publications)

Appropriated	$1,800.00	
Subscriptions to North American Flora	373.04	2,173.04
Expended		2,113.02
Balance		60.02

Income of Stokes Fund (Preservation of Native Plants)

Appropriated		$200.00
Expended		5.22
Balance		194.78

Income of Students Research Fund

Appropriated		$200.00
Expended		200.00

Insurance

Appropriated		$400.00
Expended		381.60
Balance		18.40

Investigations at Other Institutions

Appropriated	$1,000.00	
Refund — Unexpended Balances	20.90	
Transferred from Laboratories	100.00	1,120.90
Expended		1,093.11
Balance		27.79

Laboratories

Appropriated		$1,200.00
Expended	$658.61	
Transferred to Photography	200.00	
Transferred to Investigations at other Institutions	100.00	
Transferred to Purchase of Plants	100.00	
Transferred to Contingent Fund	125.00	1,183.61
Balance		16.39

Lectures and Lantern Slides

Appropriated		$1,000.00
Expended		993.03
Balance		6.97

Library

Appropriated	$3,000.00	
Sale of duplicate pamphlet	.35	3,000.35
Expended		2,942.07
Balance		58.28

Museums and Herbarium

Appropriated	$3,000.00	
Refund — Expressage overpaid	7.55	3,007.55
Expended	2,925.75	
Transferred to Stable Equipment	65.00	2,990.75
Balance		16.80

Photography

Appropriated	$400.00	
Sale of photographic materials	12.25	
Transferred from Laboratories	200.00	
Transferred from Horticultural Prizes	25.00	637.25
Expended		636.90
Balance		.35

Plans for Propagating Houses

Appropriated		$100.00
Expended		100.00

Publications (General Fund)

Appropriated	$1,000.00	
Refund — Expressage overpaid	.20	1,000.20
Expended	971.11	
Transferred to Contingent Fund	25.00	996.11
Balance		4.09

Purchase of Plants

Appropriated	$400.00	
Refund — Expressage overpaid	4.02	
Transferred from Laboratories	100.00	504.02
Expended	400.02	
Transferred to Contingent Fund	100.00	500.02
Balance		4.00

Resident Research Scholarships

Appropriated		$500.00
Expended		500.00

Secretary

Appropriated		$1,500.00
Expended		1,500.00

Special Assistance

Appropriated		$600.00
Expended	$544.38	
Transferred to Contingent Fund	50.00	594.38
Balance		5.62

Stable Equipment

Transferred from Circulars for Membership	$250.00	
Transferred from Horticultural Prizes......	55.00	
Transferred from Museums and Herbarium	65.00	370.00
Expended...		370.00

Total Appropriated for Garden Accounts..	$24,070.00	
Subscriptions (Income of Lydig Fund)...	373.04	
Sales..	12.60	
Refunds	154.05	24,609.69
Total Expended for Garden Accounts......		24,191.46
Balance		418.23

4. Special Garden Accounts

Conservatory Fund

Subscribed 1900................................	$2,110.00	
Subscribed 1901................................	25.00	
Refund — Balance on Draft	15.27	
Subscribed 1902................................	486.55	
Refund — Unexpended Balance............	9.70	
Subscribed 1903................................	200.00	
Sale of Duplicate Palms.......................	100.00	
Sale of Plants...................................	78.00	
Sale of Palms 1904	125.00	3,149.52
Expended 1900................................	710.44	
Expended 1901.	1,437.42	
Expended 1902................................	404.41	
Expended 1903....	447.66	
Expended 1904................................	121.21	3,121.14
Balance.........................		28.38

Exploration Fund

Subscribed 1901................................	$ 2,050.00	
Refund — Balance on Drafts.................	87.59	
Subscribed 1902................................	2,130.00	
Refund — Unexpended Balance............	180.56	
Subscribed 1903................................	1,565.00	
Refunds — Unexpended Balances...........	275.11	
Subscribed 1904................................	3,183.45	
Refunds — Unexpended Balances...........	110.50	

Subscribed 1905	2,575.00	
Sale of Duplicate Palms	100.00	
Refund — Part of Expenses — Exploration to the Bahamas	125.00	
Subscribed 1906	1,050.00	13,432.21
Expended 1901	2,130.95	
Expended 1902	1,258.32	
Expended 1903	2,880.72	
Expended 1904	2,878.28	
Expended 1905	3,003.37	
Expended 1906	1,027.25	13,178.89
Balance		253.32

Museum and Herbarium Fund

Subscribed 1901	$1,800.00	
Subscribed 1902	655.00	
Refund (Advance Charges on Specimens, Account of R. S. Williams)	131.09	
Subscribed 1903	1,405.00	
Sale of Specimens	29.50	
Subscribed 1904	100.00	
Subscribed 1906	2,550.00	6,670.59
Expended 1901	1,546.19	
Expended 1902	1,024.96	
Expended 1903	1,437.63	
Expended 1904	100.00	
Expended 1906	2,224.57	6,333.35
Balance		337.24

Special Book Fund

Subscribed 1899	$4,950.00
Subscribed 1901	1,825.00
Subscribed 1902	2,265.00
Subscribed 1903	1,315.00
Special Contribution from Mr. Andrew Carnegie	1,997.88
Sale of Books	59.60
Refund — Balance on Drafts	20.93
Subscribed 1904	1,540.00
Sale of Duplicate Books	15.15

Subscribed 1905		2,175.00	
Sale of Duplicate Books		25.50	
Subscribed 1906		310.00	16,499.06
Expended 1899		1,916.65	
Expended 1900		2,395.28	
Expended 1901		2,463.02	
Expended 1902		2,256.25	
Expended 1903		3,397.75	
Expended 1904		1,031.92	
Expended 1905 (as per Last Report)	$2,183.09		
Less — Exchange on Drafts	4.10	2,178.99	
Expended 1906		748.29	16,388.15
Balance			110.91
Total Expended from Funds of the Garden			28,609.80

WALTER S. GROESBECK,
Accountant.

E. & O. E.
NEW YORK, January 14, 1907.

REPORT OF THE CHAIRMAN OF THE BOARD OF SCIENTIFIC DIRECTORS FOR 1906

TO THE BOARD OF MANAGERS, NEW YORK BOTANICAL GARDEN.

Gentlemen: During the present year the Board of Scientific Directors has put into successful operation the system of holding four stated meetings a year on the second Saturday of April, June, October and December. These are held at the Garden and give the members of the Board opportunity to become more intimately informed in regard to the work in progress at the Garden, and personally aware of its growing needs. The interest of the members is unfailing, and the activity of the Board is limited only by the want of sufficient funds with which to carry on the scientific work already in progress and commence other work imperatively needed.

Early in the year the preparation of a satisfactory guide Book was referred to the Director together with the selection of guides for the personal inspection of the Garden. This has resulted in the publication of a first guide book to the entire collections, and a system of personal guides has been inaugurated which should be of material advantage in the educational value of the collections to the general public.

The matter of proper illustrations of the perishable fleshy fungi for the better illustration of the local flora was taken up and has resulted in the perfection of arrangements with Mr. George E. Morris for supplying colored drawings of these interesting plants. This should supply an attractive as well as an instructive exhibit in our educational series.

The most important development of the scientific work of the Garden during the past year has been in the direction of exploration, particularly in the American tropics, as a necessary preliminary to the publication of the North American Flora now in progress. Exploration has proceeded in a satisfactory manner in expeditions to Porto Rico by the Director and Dr. Howe, to Costa Rica by Mr. W. R. Maxon,

to various islands of the Bahama group by Mr. L. J. K. Brace, to eastern Cuba by Mr. Taylor, to Mexico by Dr. D. T. MacDougal and Dr. J. N. Rose, to Jamaica by Dr. Britton and your chairman, and to tropical Florida by Dr. Small. All these expeditions have resulted in bringing together a very extensive series of living and preserved plants, and adding materially to our knowledge of the relations of the floras of these regions. Added to these, two expeditions are now in progress, to Jamaica by Dr. Howe and to Montserrat by Dr. Shafer. The Board has also granted the Director leave to carry on a final expedition in the outlying islands of the Bahama group to commence in February, 1907, and at the December meeting has taken the following action relative to future exploration:

"The following recommendations relative to the problem of exploration of the tropics are the result of past experience in the work accomplished:

"1. One more expedition to the Bahamas, added to the exploration now in progress by Mr. Brace, will place the flora of this group of islands in a practically complete condition. Steps are already afoot to prepare for publication a descriptive flora of these islands.

"2. Exploration of the island of Hispaniola (consisting of the two republics of Haïti and Santo Domingo) has not kept pace with that of the three other greater Antilles. It is important for those studying the flora of the West Indies to have as uniformly complete collections from the principal areas as possible, in order to correlate their studies in geographic distribution. Hispaniola is largely a great unknown, botanically speaking, and the principal accurate results accessible to American botanists are the collections made by Mr. Nash and his associates during two expeditions to Haïti. It is very important that large collections be secured at as early a date as possible from this island, and we recommend the inauguration of a large expedition for this purpose. We would emphasize the word *large* since the conditions of the country are such that it is practically poor economy to send

one or two people there for a few weeks. We need an expedition with several active collectors remaining a sufficient time in the island to attain the higher altitudes where the endemic features of the flora will probably be more abundant.

"3. One of the greatest needs of our collectors in the West Indies and a need that is being made known constantly by visitors to these islands, as well as by settlers from our own country in these islands, is some means of knowing the island flora with a minimum of critical effort. This is becoming specially pressing from the increasing number of American students who are now visiting Jamaica where we are maintaining a tropical laboratory. Grisebach's Flora of the British West Indies published in 1864 was made by a German working at long range (because he had never visited the West Indies), is full of errors, out of date, and its cumbrous style has never adapted it for successful and rapid field use. It does not give more than four fifths of the present known flora of this most important English-speaking island. The time is not ripe for the publication of a descriptive flora, for there are large areas yet to be explored, and species new to science are coming constantly to light. There is need, however, of a revised list of plants of the island which to be of real value must be accompanied by synopses of the families, genera, and species. Such a synopsis of even the tropical plant families of America is not available to this day in the English language, and this alone would be of great value not only in Jamaica but in all parts of the American tropics. The critical work on such a proposed synopsis can only be done in the presence of such facilities as are afforded by this Garden. In the case of Jamaica, however, we have a most fortunate source of assistance in the person of Mr. William Harris, Superintendent of Hope Gardens, who has spent much time during his twenty-five years residence in the island in active field work, and has brought to light a large number of species new to science, and is more familiar than any other person with the flora of Jamaica in

the field. We recommend therefore, (1) That steps be taken by the Garden for the preparation of such a synoptical list of Jamaica plants; (2) That some one be detailed by the Director to commence this work as a part of his regular duties; and (3) That Mr. Harris, Superintendent of Hope Garden, Jamaica, be asked to coöperate in the preparation of this synopsis, because of his long-extended field work and his familiarity with the flora of Jamaica from the standpoint of a field naturalist.

"4. Recent exploration in Guatemala and Costa Rica by Mr. Maxon has emphasized what had before been strongly suspected, namely, a close affinity between the floras of the higher mountain regions of Central America and the mountains of Jamaica. In order to comprehend properly these two related floras, we need much more extensive material from Costa Rica especially, from which country our American collections are notably weak; and we recommend that further expeditions be made to this country as soon as it is possible."

Measures have been taken to increase the efficiency of the tropical laboratory at Cinchona and make it more useful to American botanists through coöperation with the various botanical laboratories of the country.

The problem of the proper illustration of our scientific papers is a serious one. The increasing tendency to adopt processes for the reproduction of scientific illustrations that do not yield *permanent* results has led the Scientific Directors to take the following action, passed at their December meeting:

"The problem of illustration of scientific papers issued by the Garden is a very serious one and demands careful attention. A fund for the satisfactory illustration of American plants is a great desideratum. Until such a fund exists, we deem it a matter of prime importance to publish plates in a form that will not only accurately represent the plant structure in question, but that will be reproduced by a process that is permanent. Illustration by half-tones is poor at best, and to

show at their best must be printed on a glazed (*i. e.*, clay-covered) paper; these may serve a purpose in semi-popular or ephemeral publications like guide-books, but for real scientific works they are (1) poorly suited for accurate illustration, and what is still worse they are (2) not lasting. We deem it better to publish, if necessary, fewer illustrations at a higher price and have these done well, than to issue any really scientific illustrations that are not of a permanent character. Half-tones and other illustrations that have to be printed on clay-covered paper should be excluded from our scientific publications."

Respectfully submitted,

LUCIEN M. UNDERWOOD,

Chairman of the Board of Scientific Directors.

REPORT OF THE COMMITTEE ON PATRONS, FELLOWS, AND MEMBERS

To the Board of Managers of the New York Botanical Garden.

Gentlemen: The number of new members who have qualified during the past year is 69. The number of annual members is now 934, life members 167, sustaining members 28, fellowship members 6.

Of these 22 are now in arrears for dues for 1906, 11 are in arrears for 1905 and 1906, 10 are in arrears for 1904, 1905 and 1906, and 3 are in arrears for 1903, 1904, 1905 and 1906.

Annual dues have been collected to the amount of $8,920, which has been transmitted to the Treasurer as received.

One person has qualified as a life member by the payment of $250. This sum has been transmitted to the Treasurer for credit to the Endowment Fund.

Six persons have qualified as sustaining members. Their fees aggregating $150 have been transmitted to the Treasurer as received.

A complete list of all classes of members to date is herewith submitted.

New York, January 14, 1907.

Benefactors

Hon. Addison Brown,
Andrew Carnegie,
Columbia University,
* Hon. Chas. P. Daly,
D. O. Mills,
J. Pierpont Morgan,
John D. Rockefeller,
* Cornelius Vanderbilt.

Patrons

Mrs. Geo. Whitfield Collord,
* James M. Constable,
* Wm. E. Dodge,
Geo. J. Gould,
Miss Helen M. Gould,
Mrs. Esther Herrman,
John S. Kennedy,
* Oswald Ottendorfer,
William Rockefeller,
* Wm. C. Schermerhorn,
Jas. A. Scrymser,
Samuel Sloan,
Mrs. Antoinette Eno Wood.

* Deceased.

Fellows for Life

James B. Ford,
Morris K. Jesup,
John Innes Kane,
Hon. Seth Low,
M. F. Plant,
Francis Lynde Stetson,
Miss Caroline Phelps Stokes,
Miss Olivia E. Phelps Stokes,
Samuel Thorne,
Tiffany & Co.,
H. C. von Post.

Life Members

Edward D. Adams,
Dr. Felix Adler,
A. G. Agnew,
Miss A. G. Agnew,
Mrs. James Herrman Aldrich,
Richard H. Allen,
Bernard G. Amend,
Constant A. Andrews,
J. Sherlock Andrews,
Wm. A. Anthony,
Dr. S. T. Armstrong,
Mrs. H. D. Auchincloss,
Samuel P. Avery, Jr.,
Samuel D. Babcock,
Geo. V. N. Baldwin,
Dr. John Hendley Barnhart,
Gustav Baumann,
Samuel R. Betts,
Miss Elizabeth Billings,
Miss Mary M. Billings,
J. O. Bloss,
George Blumenthal,
George C. Boldt,
G. F. Bonner,
Geo. S. Bowdoin,
J. Hull Browning,
Miss Matilda W. Bruce,
Joseph Bushnell,
T. Morris Carnegie,
Frank R. Chambers,
Hugh J. Chisholm,
Hugh J. Chisholm, Jr.,
E. Dwight Church,
Geo. C. Clark,
Banyer Clarkson,
Wm. F. Cochran,
William Colgate,
Miss Georgette T. A. Collier,
Mrs. William Combe,
W. E. Connor,
Wm. L. Conyngham,
Theodore Cooper,
Zenas Crane,
R. N. Cranford,
Melville C. Day,
Mrs. John Ross Delafield,
Miss Julia L. Delafield,
Maturin L. Delafield, Jr.,
Anthony Day,
W. B. Dickerman,
James Douglas,
Miss Josephine W. Drexel.
Miss Ethel DuBois,
Miss Katharine DuBois,
Wm. A. DuBois,
Geo. E. Dunscombe,
Thomas Dwyer,
Newbold Edgar,
George Ehret,
David L. Einstein,
Ambrose K. Ely,
Amos F. Eno,

Edward J. Farrell,
Andrew Fletcher,
Chas. R. Flint,
Henry C. Frick,
Mrs. Theodore Kane Gibbs,
James J. Goodwin,
Daniel Guggenheimer,
Bernard G. Gunther,
Franklin L. Gunther,
Frederic R. Halsey,
Chas. J. Harrah,
Dr. Louis Haupt,
H. O. Havemeyer,
R. Somers Hayes,
James J. Higginson,
George B. Hopkins,
Samuel N. Hoyt,
Gen. Thos. H. Hubbard,
Archer M. Huntington,
Frank D. Hurtt,
James H. Hyde,
Adrian Iselin,
Mrs. Columbus O'D. Iselin,
Theo. F. Jackson,
Dr. Walter B. James,
Dr. E. G. Janeway,
Miss Annie B. Jennings,
Walter R. T. Jones,
Eugene Kelly, Jr.,
Nathaniel T. Kidder,
William M. Kingsland,
H. R. Kunhardt,
W. B. Kunhardt,
Charles Lanier,
W. V. Lawrence,
Meyer H. Lehman,
Mrs. George Lewis,
Joseph Loth,
David Lydig,
C. W. McAlpin,
Guy R. McLane,
Wm. H. Macy, Jr.,
Mrs. Wm. H. Macy, Jr.,
Alexander Maitland,
Dr. Francis H. Markoe,
Louis Marshall,
Edgar L. Marston,
Bradley Martin,
Dr. Geo. N. Miller,
A. G. Mills,
John G. Moore,
Hon. Levi P. Morton,
Sigmund Neustadt,
A. Lanfear Norrie,
Gordon Norrie,
Geo. M. Olcott,
Mrs. Chas. Tyler Olmstead,
Wm. Church Osborn,
Lowell M. Palmer,
Henry Parish,
Geo. Foster Peabody,
Wm. Hall Penfold,
Geo. W. Perkins,
W. H. Perkins,
Mrs. Henry C. Potter,
James Tolman Pyle,
M. Taylor Pyne,
Geo. W. Quintard,
J. C. Rodgers,
H. H. Rogers,
Jacob Rubino,
Thomas F. Ryan,
Wm. R. Sands,
Reginald H. Sayre,
Edward C. Schaefer,
Jacob H. Schiff,
Mortimer L. Schiff,
Grant B. Schley,
Mrs. I. Blair Scribner,
Isaac N. Seligman,

Geo. Sherman,
William D. Sloane,
James Speyer,
Anson Phelps Stokes,
Miss Ellen J. Stone,
Albert Tag,
Paul G. Thebaud,
Charles G. Thompson,
Robert M. Thompson,
Miss Phebe Anna Thorne,
William Thorne,
Wm. Stewart Tod,
Spencer Trask,
Miss Susan Travers,
Miss Anna Murray Vail,
F. T. Van Beuren,
Dr. Henry Freeman Walker,
F. N. Warburg,
John I. Waterbury,
Miss Emily A. Watson,
S. D. Webb,
Dr. W. Seward Webb,
Mrs. Joseph M. White,
John D. Wing,
Charles T. Yerkes.

Fellowship Members

George A. Archer,
Mrs. Farquhar Ferguson,
George Foster Peabody,
Geo. W. Perkins,
Mortimer L. Schiff,
Wm. D. Sloane.

Sustaining Members

Miss Elizabeth Billings,
Temple Bowdoin,
Dr. N. L. Britton,
Miss Mary T. Bryce,
Mrs. William Bryce,
T. Morris Carnegie,
Chas. F. Cox,
D. Stuart Dodge,
James Douglas,
Wm. B. Osgood Field,
Wm. H. Fischer,
John Greenough,
L. A. Heinsheimer,
O. H. Kahn,
Prof. Morris Loeb,
Franklin B. Lord,
Rev. Haslett McKim,
Jacob Mahler,
Arthur M. Mitchell,
Miss Eva V. C. Morris,
Quincy L. Morton,
Wm. Church Osborn,
Mrs. Edwin Parsons,
Miss Martha Potter,
Auguste Richard,
T. G. Sellew,
Rev. J. Henry Watson,
John T. Willets.

Annual Members

Dr. Robert Abbe,
David T. Abercrombie,
Fritz Achelis,
Ernest R. Ackerman,
Samuel Adams,
Dr. I. Adler,

Mrs. Cornelius R. Agnew,
Mrs. William Alexander,
John E. Alexandre,
J. H. Alexandre,
Robert F. Amend,
G. Amsinck,
John A. Amundson,
Ernest J. H. Amy,
A. J. C. Anderson,
J. M. Andreini,
A. B. Ansbacher,
John D. Archbold,
Francis J. Arend,
Reuben Arkush,
Mrs. H. O. Armour,
Dr. Edmund S. F. Arnold,
Col. John Jacob Astor,
Hugh D. Auchincloss,
John W. Auchincloss,
Pearce Bailey,
Miss Charlotte S. Baker,
Frederic Baker,
Geo. F. Baker,
Stephen Baker,
Frederick H. Baldwin,
Alwyn Ball, Jr.,
Mrs. Thos. R. Ball,
Francis Bannerman,
John S. Barnes,
Miss Mildred Barnes,
Chas. T. Barney,
Miss Katharine Barney,
Wm. M. Barnum,
William Barr,
Geo. D. Barron,
Chas. Baskerville,
E. W. Bass,
Chas. Batchelor,
Mrs. N. E. Baylies,
Alfred N. Beadleston,
Wm. R. Beal,
Dr. C. Adelbert Becker,
Gerard Beekman,
M. H. Beers,
August Belmont,
Perry Belmont,
James H. Benedict,
L. L. Benedict,
James Gordon Bennett,
Frank Sherman Benson,
Chas. M. Bergstresser,
Gustav Bernheim,
Mrs. Adolph Bernheimer,
Chas. L. Bernheimer,
Simon E. Bernheimer,
Philip Berolzheimer,
Edward J. Berwind,
G. N. Best,
Henry Beste,
Albert S. Bickmore,
Eugene P. Bicknell,
Mrs. Sylvan Bier,
L. Horatio Biglow,
Isaac Bijur,
Moses Bijur,
W. H. Birchall,
Francis C. Bishop,
H. R. Bishop,
James C. Bishop,
Mrs. D. C. Blair,
Mrs. Birdseye Blakeman,
Mrs. S. A. Blatchford,
Cornelius N. Bliss,
Ernest C. Bliss,
E. W. Bliss,
Miss S. D. Bliss,
Jno. H. Bloodgood,
Mrs. Edward C. Bodman,
Henry W. Boettger,
Edward C. Bogert,

Frank S. Bond,
Hon. H. W. Bookstaver,
Mrs. Sydney C. Borg,
Frederick G. Bourne,
John M. Bowers,
James B. Brady,
E. T. Bragaw,
Miss Cornelia G. Brett,
Mrs. Benjamin Brewster,
Elbert A. Brinckerhoff,
Chas. Astor Bristed,
Miss May C. Bristol,
Jno. I. D. Bristol,
Mrs. Harriet Lord Britton,
Mrs. Kate M. Brookfield,
Mrs. H. D. Brookman,
Edwin H. Brown,
Miss E. W. Brown,
John Crosby Brown,
M. Bayard Brown,
Robert I. Brown,
Vernon C. Brown,
W. L. Brown,
W. P. Brown,
F. W. Bruggerhoff,
H. B. Brundrett.
William Bryce, Jr.,
W. Buchanan,
Albert Buchman,
Edwin M. Bulkley,
W. L. Bull,
H. C. Bumpus,
James A. Burden, Jr.,
Edward G. Burgess,
Edward S. Burgess,
Mrs. Edward M. Burghard,
John S. Bush,
Mrs. Wendell L. Bush,
Miss Helen C. Butler,
Wm. H. Butler,
Mrs. Daniel Butterfield,
John L. Cadwalader,
H. A. Caesar,
Albert Calman,
Henry L. Calman,
W. L. Cameron,
H. H. Cammann,
Henry L. Cammann,
Mrs. John Campbell,
Richard A. Canfield,
H. W. Cannon,
Mrs. Miles B. Carpenter,
R. A. Carter,
H. T. Cary,
Chas. L. Case,
John H. Caswell,
John R. Caswell,
Robert Caterson,
Miss Jennie R. Cathcart,
Prof. J. McK. Cattell,
Miss Maria Bowen Chapin,
Mrs. Geo. H. Chatillon,
J. E. Childs,
B. Ogden Chisolm,
Geo. E. Chisolm,
Mrs. Wm. E. Chisolm,
Wm. G. Choate,
Mrs. Helen L. Chubb,
Theodore W. Church,
John Claflin,
George S. Clapp,
D. Crawford Clark,
Miss Emily Vernon Clark,
J. Mitchell Clark,
Thos. F. Clark,
W. A. Clark,
E. A. S. Clarke,
George C. Clausen,
Wm. P. Clyde,
Dr. Wm. J. Coates,

John W. Cochrane,
Miss Mary F. Cockcroft,
Hon. W. Bourke Cockran,
Mrs. Ogden Codman,
C. A. Coffin,
Edmund Coffin,
E. W. Coggeshall,
Samuel M. Cohen,
N. A. Colburn,
Mrs. James B. Colgate,
R. R. Colgate,
P. F. Collier,
Miss Ellen Collins,
Mrs. Minturn Post Collins,
Stacy Budd Collins,
Miss Mary Compton,
T. G. Condon,
Henry C. Conger,
Roland R. Conklin,
C. T. Cook,
Mrs. C. T. Cook,
Mrs. Lilian Gillette Cook,
Mrs. Austin Corbin,
C. R. Corning,
Mrs. Charles Henry Coster,
Miss Ellen H. Cotheal,
Winthrop Cowdin,
Clarkson Cowl,
Mark T. Cox,
Geo. F. Crane,
Jonathan H. Crane,
Mrs. Jonathan H. Crane,
Mrs. Agnes Huntington Cravath,
Thos. Crawford,
Dr. W. H. Crawford,
H. G. Crickmore,
John D. Crimmins,
Geo. A. Crocker,
Frederic Cromwell,
Jas. W. Cromwell,
Chas. H. Cronin,
Geo. W. Crossman,
Edwin A. Cruikshank,
Guy W. Culgin,
Chas. Curie,
Ellicott D. Curtis,
G. Warrington Curtis,
R. Fulton Cutting,
W. Bayard Cutting,
C. H. Dale,
Henry Dalley,
Wm. B. Dana,
Geo. H. Daniels,
Mrs. Ira Davenport,
J. Clarence Davies,
Julien T. Davies,
Wm. Gilbert Davies,
John H. Davis,
Clarence S. Day,
Mrs. Henry Mills Day,
E. J. de Coppet,
H. de Coppet,
Richard Deeves,
Dr. Robert W. de Forest,
Mrs. Robert W. de Forest,
Mrs. Courtenay De Kalb,
B. F. DeKlyn,
Eugene Delano,
Wm. C. Demorest,
John B. Dennis,
Charles de Rham,
Walter D. Despard,
F. W. Devoe,
Chas. D. Dickey,
Charles C. Dickinson,
Geo. H. Diehl,
Chas. F. Dieterich,
Miss Mary A. Dill,
E. R. Dillingham,
Geo. E. Dimock,

Mrs. Henry F. Dimock,
Rev. Morgan Dix,
Cleveland H. Dodge,
Miss Grace H. Dodge,
Norman W. Dodge,
Mrs. Wm. E. Dodge,
Peter Doelger,
C. W. Doherty,
L. F. Dommerich,
Henry Dorscher,
Mrs. George William Douglas,
Alfred Douglass,
R. D. Douglass,
Mrs. David Dows,
Tracy Dows,
B. Ferdinand Drakenfield,
Mrs. Henry Draper,
Isaac W. Drummond,
Matthew B. DuBois,
Carroll Dunham,
Dr. Edward K. Dunham,
Mrs. George H. Dunham,
E. B. Dunne,
James Dunne,
J. B. Dutcher,
D. Edgar,
Miss Laura Jay Edwards,
Edward Ehrlich,
Henry G. Eilshemius,
August Eimer,
Emanuel Einstein,
William Einstein,
Mrs. Matilda A. Elder,
Roswell Eldridge,
Geo. W. Ellis,
John W. Ellis,
J. M. Ellsworth,
John J. Emery,
C. Temple Emmet,
Robert Temple Emmet,
Robert Endicott,
Ad. Engler,
Jno. C. Eno,
R. Erbsloh,
Arthur F. Estabrook,
Louis Ettlinger,
Richard Evans,
A. W. Evarts,
H. C. Fahnestock,
Chas. V. Faile,
Chas. S. Fairchild,
Samuel W. Fairchild,
G. W. R. Fallon,
Jas. C. Fargo,
Walton Ferguson,
Pliny Fisk,
Harry Harkness Flagler,
Isaac D. Fletcher,
Miss Helena Flint,
A. R. Flower,
Miss Mary A. Flower,
James D. Foot,
Scott Foster,
Henry E. Frankenberg,
Werner V. Frankenberg,
Alfred Fraser,
Mrs. Geo. S. Fraser,
W. C. Fraser,
Samson Fried,
A. S. Frissell,
E. A. Funke,
W. F. Gade,
Geo. F. Gantz,
John A. Garver,
Joseph E. Gay,
Mrs. James Gayley,
Frederick Gebhard,
Mrs. Walter Geer,
Thos. Ghee,
John J. Gibbons,

Mrs. Hervey de Blois Gibson,
R. W. Gibson,
J. Waldron Gillespie,
Frederic N. Goddard,
Mrs. S. D. Godfrey,
Mrs. Edwin L. Godkin,
S. L. Goldenberg,
Samuel Goodman,
Chas. Gotthelf,
Chas. A. Gould,
Edwin Gould,
R. R. Govin,
Robert D. Graham,
Henry Graves,
Nelson Z. Graves,
John Clinton Gray,
Ernest F. Greeff,
Isaac J. Greenwood,
Rev. David H. Greer,
Edward C. Gregory,
Daniel J. Griffin,
Mrs. William P. Griffith,
E. Morgan Grinnell,
C. A. Griscom, Jr.,
William Guggenheim,
Fred. A. Guild,
W. C. Gulliver,
Miss Delia L. Gurnee,
W. S. Gurnee, Jr.,
Dr. Alexander Hadden,
John A. Hadden, Jr.,
J. and M. Haffen,
James D. Hague,
Henry F. Haines,
Hon. Ernest Hall,
Wm. Halls, Jr.,
Miss Laura P. Halsted,
Wm. Hamann,
Miss Katherine L. Hamersley,
Louis Gordon Hamersley,
Miss Adelaide Hamilton,
Miss Elizabeth S. Hamilton,
Jas. B. Hammond,
Chas. T. Harbeck,
Anson W. Hard,
J. Montgomery Hare,
E. S. Harkness,
E. H. Harriman,
Oliver Harriman,
S. W. Harriot,
Alan C. Harris,
N. W. Harris,
William Hamilton Harris,
Archibald Harrison,
Miss Rebecca Harvey,
Jacob Hasslacher,
Dr. Valery Havard,
F. C. Havemeyer,
J. C. Havemeyer,
T. A. Havemeyer,
G. G. Haven,
H. C. Haven,
J. Woodward Haven,
Matthew Hawe,
E. Hawley,
Miss Caroline C. Haynes,
Arthur H. Hearn,
Wm. W. Heaton,
John G. Heckscher,
Arthur P. Heinze,
Clemens Heitemeyer,
Homer Heminway,
Chas. R. Henderson,
Chas. Henderson & Son,
Edmund Hendricks,
Harmon W. Hendricks,
Ferdinand Hermann,
Selmar Hess,
H. H. Hewitt,
Mrs. Sarah A. Hewitt,

Mrs. Daniel M. Hildreth,
George D. Hilyard,
Walter Hinchman,
Wm. K. Hinman,
Chas. S. Hirsch,
J. Oakley Hobby,
B. Hochschild,
George F. Hodgman,
Alfred G. Hoe,
Richard M. Hoe,
Mrs. Richard March Hoe,
Mrs. Robert Hoe,
John Swift Holbrook,
E. B. Holden,
E. R. Holden,
Henry Holt,
Joseph Honig,
William W. Hoppin,
Frederick B. House,
Wm. P. Howe,
M. D. Howell,
Gerald L. Hoyt,
Alex. C. Humphreys,
Mrs. E. W. Humphreys,
Mrs. C. P. Huntington,
Mrs. Robert P. Huntington,
Adolph G. Hupfel,
Frank Hustace,
John S. Huyler,
Clarence M. Hyde,
Frederick E. Hyde, Jr.,
Henry Iden, Jr.,
Mrs. Samuel Inslee,
John B. Ireland,
Adrien Iselin, Jr.,
C. Oliver Iselin,
Miss Georgine Iselin,
William E. Iselin,
Samuel Isham,
Wm. B. Isham,
Wm. M. Ivins,
Frederic Wendell Jackson,
Dr. Abram Jacobi,
A. C. James,
D. Willis James,
Dr. Robert C. James,
O. G. Jennings,
Walter Jennings,
Mrs. Maria de W. Jesup,
Adrian H. Joline,
Dwight A. Jones,
Mrs. Townsend Jones,
Jos. L. Kahle,
Louis Kahn,
Miss Louise Langdon Kane,
S. Nicholson Kane,
Theo. Kauffeld,
Mrs. H. F. Kean,
Frank Browne Keech,
Mrs. Chas. Kellogg,
Thos. H. Kelly,
Prof. J. F. Kemp,
H. Van Rensselaer Kennedy,
Mrs. Elizabeth Kenyon,
Rudolph Keppler,
Mrs. Catherine L. Kernochan,
John B. Kerr,
Geo. A. Kessler,
W. Keuffel,
Wm. Kevan,
Patrick Kiernan,
S. E. Kilner,
Alfred R. Kimball,
David H. King, Jr.,
Le Roy King,
M. K. King,
William F. King,
Gustave E. Kissel,
E. C. Klipstein,
Herman Knapp,

Chas. Kohlman,
H. C. Kudlick,
Julius G. Kugelman,
Percival Kühne,
Adolf Kuttroff,
William M. Laffan,
Walter Laidlaw,
Francis G. Landon,
Edward V. Z. Lane,
Woodbury Langdon,
Woodbury G. Langdon,
J. Langeloth,
Dr. G. Langmann,
Lewis H. Lapham,
M. J. Lavelle,
John Burling Lawrence,
Mrs. Lydia G. Lawrence,
Mrs. Samuel Lawrence,
J. D. Layng,
Charles N. Lee,
Prof. Frederic S. Lee,
Mrs. Frederic S. Lee.
Marshall C. Lefferts,
Wm. H. Lefferts,
Emanuel Lehman,
Lemcke & Buechner,
Edward A. Le Roy, Jr.,
Arthur L. Lesher,
Dr. A. Monae Lesser,
Wm. H. Leuppe,
Emil Levi,
Julius Levine,
Emanuel Levy,
Mrs. John V. B. Lewis,
Albert Lewisohn,
Miss Alice Lewisohn,
Philip Lewisohn,
O. B. Libbey,
Lowell Lincoln,
Frederick J. Lisman,
Wm. S. Livingston,
Wm. C. Lobenstine,
James Loeb,
Walter S. Logan,
Henry Lomb,
P. Lorillard, Jr.,
R. P. Lounsberry,
C. Adolphe Lowe,
Miss Carlotta R. Lowell,
Thomas Lowry,
Charles H. Ludington,
August Lueder,
Walther Luttgen,
Mrs. Alida McAlan,
Geo. L. McAlpin,
John A. McCall,
John J. McCook,
Mrs. W. H. McCord,
John A. McKim,
James McLean,
Geo. R. MacDougall,
J. W. Mack,
Clarence H. Mackay,
Malcolm MacMartin,
Mrs. Chas. A. Macy, Jr.,
V. Éverit Macy,
F. Robert Mager,
J. H. Maghee,
Chas. Mallory,
Howard Mansfield,
Miss Delia W. Marble,
Theophilus M. Marc,
A. Marcus,
Jacob Mark,
John Markle,
Dr. J. W. Markoe,
Henry S. Marlor,
C. P. Marsh,
Chas. H. Marshall,
Edwin S. Marston,

Mrs. E. Howard Martin,
W. R. H. Martin,
Francis Taylor Maxwell,
Robert Maxwell,
David Mayer,
Harry Mayer,
Effingham Maynard,
D. J. Medbury,
Mrs. Emma Mehler,
Herman A. Metz,
Dr. Alfred Meyer,
Edwin O. Meyer,
Harry J. Meyer,
J. Meyer,
Thos. C. Meyer,
Geo. M. Miller,
Jacob F. Miller,
Roswell Miller,
S. M. Milliken,
Peter Moller,
Alphonse Montant,
G. L. Montgomery,
Chas. Arthur Moore, Jr.,
Wm. H. Helme Moore,
Miss Annie T. Morgan,
Miss C. L. Morgan,
E. D. Morgan,
Geo. H. Morgan,
A. H. Morris,
A. Newbold Morris,
Mrs. A. Newbold Morris,
Mrs. Cora Morris,
Mrs. Dave Hennen Morris,
Henry Lewis Morris,
John Morris,
Louis R. Morris,
Fred. V. Morrison,
Geo. Austin Morrison,
C. W. Morse,
Richard Mortimer,
Henry C. Mott,
Carl Muller,
Frank A. Munsey,
Miss Catherine Murray,
J. G. Myers,
Nathaniel Myers,
Edward M. Neill,
Wm. Nelson,
A. G. Nesbitt,
Miss Catherine A. Newbold,
Miss Edith Newbold,
Frederic R. Newbold,
H. Victor Newcomb,
Zenas E. Newell,
Wm. Nilsson,
John Notman,
Francis J. Oakes,
Adolph Obrig,
E. E. Olcott,
Robert Olyphant,
Mrs. Emerson Opdycke,
Wm. S. Opdyke,
Mrs. Wm. Openhym,
William C. Orr,
Prof. Henry F. Osborn,
Augustus G. Paine,
S. S. Palmer,
Henry Parish, Jr.,
James C. Parrish,
Henry V. A. Parsell,
John E. Parsons,
R. W. Paterson,
W. A. Paton,
O. H. Payne,
T. W. Pearsall,
Mrs. Frederick Pearson,
Miss Frances Pell,
Stephen H. P. Pell,
Geo. H. Penniman,
Chas. J. Perry,

Chas. G. Peters,
Samuel T. Peters,
W. R. Peters,
Chas. Pfizer, Jr.,
Guy Phillips,
Lloyd Phoenix,
Phillips Phoenix,
Gottfried Piel,
Michael Piel,
Henry Clay Pierce,
Winslow S. Pierce,
Gifford Pinchot,
James W. Pinchot,
Fred. S. Pinkus,
Albert Plant,
Hon. Thos. C. Platt,
Gilbert M. Plympton,
H. F. Poggenburg,
Chas. Lane Poor,
Henry W. Poor,
A. S. Post,
H. A. V. Post,
C. A. Postley,
Miss Blanche Potter,
Frederick Potter,
De Veaux Powel,
Geo. W. Powers,
Theo. H. Price,
Chas. Pryer,
J. Harsen Purdy,
Percy R. Pyne,
Dr. Edward Quintard,
Charles Raht,
Gustav Ramsperger,
Geo. Curtis Rand,
Edmund D. Randolph,
S. Rawitser,
G. B. Raymond,
Geo. R. Read,
Wm. A. Read,
G. H. Redmond,
Henry S. Redmond,
Whitelaw Reid,
Geo. N. Reinhardt,
W. E. Reis,
E. B. Reynolds,
John B. Reynolds,
Miss Serena Rhinelander,
John Harsen Rhoades,
Prof. P. de P. Ricketts,
John L. Riker,
Samuel Riker,
Wm. J. Riker,
H. Dillon Ripley,
Dr. Wm. C. Rives,
Miss Mary M. Roberts,
Julius Robertson,
Andrew J. Robinson,
M. Rock,
Gen. Chas. F. Roe,
Allen M. Rogers,
Edward L. Rogers,
W. Emlen Roosevelt,
Mrs. W. Emlen Roosevelt,
Hon. Elihu Root,
Albert G. Ropes,
E. V. W. Rossiter,
Jacob Rothschild,
Ludwig Rothschild,
Wm. Rothschild,
Geo. P. Rowell,
Carman R. Runyon,
Jacob Ruppert,
Edward Russ,
Mrs. A. D. Russell,
Arthur Ryle,
Augustus St. Gaudens,
Clarence Sackett,
Mrs. Edward C. Sampson,
Daniel C. Sands,

Dr. A. T. Schauffler,
Carl Schefer,
Miss Mary E. Schell,
Mrs. H. M. Schieffelin,
Dr. Wm. J. Schieffelin,
Gustave Schirmer,
Rudolph E. Schirmer,
Henry W. Schloss,
Miss Jane E. Schmelzel,
D. Schnakenberg,
Adam A. Schopp,
Chas. M. Schott, Jr.,
C. Schumacher,
Philip Schuyler,
C. M. Schwab,
Henry F. Schwarz,
Geo. S. Scott,
Robert Scoville,
Arthur H. Scribner,
Edward M. Scudder,
Francis K. Seagrist,
Charles E. Seitz,
Prof. Edwin R. A. Seligman,
George W. Seligman,
Jefferson Seligman,
Alfred Seton,
Edward M. Shepard,
Gardiner Sherman,
Wm. Shillaber,
D. E. Sickles,
John W. Simpson,
W. T. Simpson,
John Sinclair,
Francis Louis Slade,
Albert K. Smiley,
Daniel Smiley,
Chas. F. Smillie,
Mrs. Annie Morrill Smith,
F. M. Smith,
Mrs. George W. Smith,
H. Sanborn Smith,
James H. Smith,
James R. Smith,
Sydney A. Smith,
Wm. Alex. Smith,
Samuel B. Snook,
E. G. Snow,
Isaac N. Solis,
E. G. Soltmann,
Chas. Sooysmith,
Mrs. Charlotte Sorchan,
Frederick Southack,
Samuel Spencer,
W. M. Sperry,
I. M. Spiegelberg,
Paul N. Spofford,
Miss Anna Riker Spring,
Dr. Edward Hamilton Squibb,
J. R. Stanton,
James H. Stebbins,
James R. Steers,
Chas. H. Steinway,
Wm. R. Steinway,
Olin J. Stephens,
Benjamin Stern,
Isaac Stern,
Louis Stern,
Alexander H. Stevens,
Frederic W. Stevens,
Dr. Geo. T. Stevens,
Lispenard Stewart,
Wm. R. Stewart,
Miss Clara F. Stillman,
Dr. D. M. Stimson,
James Stokes,
Mason A. Stone,
Sumner R. Stone,
William Stratford,
H. P. Strause,
Chas. Strauss,

Frederick Strauss,
F. K. Sturgis,
Mrs. F. K. Sturgis,
Edmund Sturzenegger,
Rutherfurd Stuyvesant,
Mrs. Geo. Such,
Mrs. James Sullivan,
Lionel Sutro,
Miss P. C. Swords,
Miss Mary Taber,
Edward N. Tailer,
James Talcott,
C. A. Tatum,
Miss Alexandrina Taylor,
George Taylor,
Henry R. Taylor,
Stevenson Taylor,
C. H. Tenney,
H. L. Terrell,
Jno. T. Terry,
Nikola Tesla,
Thomas Thacher,
Ernst Thalmann,
Dr. Allen M. Thomas,
Geo. C. Thomas,
Seth E. Thomas,
David W. Thompson,
John C. Thompson,
L. S. Thompson,
Mrs. Samuel C. Thompson,
Dr. W. Gilman Thompson,
Jonathan Thorne,
Samuel Thorne, Jr.,
W. V. S. Thorne,
C. C. Tiffany,
Louis C. Tiffany,
Frank Tilford,
James Timpson,
J. Kennedy Tod,
William Tousey,
Mrs. Jane A. Townsend,
C. D. Tows,
J. Evarts Tracy,
Mrs. Mary S. Trimble,
Wm. Trotter,
Frederick K. Trowbridge,
Dr. Alfred Tuckerman,
Paul Tuckerman,
Geo. E. Turnure,
Benjamin Tuska,
Edward P. Tysen,
Edward Uhl,
E. S. Ullman,
Mrs. Lawsen Valentine,
Augustus Van Cortlandt,
Alfred G. Vanderbilt,
D. B. Van Emburgh,
E. H. Van Ingen,
W. Van Norden,
Edgar B. Van Winkle,
Robert A. Van Wyck,
Richard C. Veit,
Herman Vogel,
John Wagner,
Richard T. Wainwright,
Leopold Wallach,
Wm. I. Walter,
Artemus Ward,
Wm. T. Wardwell,
John Hobart Warren,
Allan C. Washington,
E. H. Weatherbee,
Mrs. John A. Weekes,
Chas. Wehrhane,
Camille Weidenfeld,
Charles W. Wells,
Mrs. John Wells,
R. E. Westcott,
Geo. Westinghouse,
Dr. John McE. Wetmore,

Dr. Geo. G. Wheelock,
Dr. Wm. E. Wheelock,
Miss Caroline White,
Horace White,
John J. White, Jr.,
Stanford White,
James Whiteley,
Miss Gertrude Whiting,
Giles Whiting,
Clarence Whitman,
Wm. Wicke,
Edward A. Wickes,
D. O. Wickham,
M. T. Wilbur,
David Willcox,
Mrs. I. T. Williams,
Mrs. Percy H. Williams,
Richard H. Williams,
W. P. Willis,
Charles T. Wills,
Geo. T. Wilson,
Henry R. Wilson,
R. T. Wilson,
Egerton Winthrop,
Grenville L. Winthrop,
Mrs. Frank S. Witherbee,
Ernst G. W. Woerz,
Emil Wolff,
Lewis S. Wolff,
Mrs. Cynthia A. Wood,
Henry R. Wood,
James Wood,
Jas. T. Woodward,
Prof. R. S. Woodward,
W. H. Woolverton,
Isidor Wormser,
P. B. Worrall,
Miss Julia Wray,
Mrs. J. Hood Wright,
A. Wurzburger,
Jno. J. Wysong,
Arthur G. Yates,
Edw. L. Young,
Andrew C. Zabriskie,
August Zinsser,
Charles Zoller,
O. F. Zollikoffer.

REPORT OF THE TREASURER

New York, January 14, 1907.

To the Board of Managers of the New York Botanical Garden.

Gentlemen: Herewith I submit a statement of my receipts and disbursements during the year 1906, and a balance sheet from my ledger as of December 31, 1906.

Respectfully yours,

C. F. Cox,
Treasurer.

Receipts

Balance as per last Annual Report.......		$ 13,348.89
Contributions of the City Towards Development and Maintenance		122,042.98
Income from Investments:		
5 per cent. on $50,000 Southern Railway Co. First Consolidated Mortgage Bonds	$ 2,500.00	
4½ per cent. on $50,000 Ches. & Ohio R. R. Co. General Mortgage Bonds	2,250.00	
4 per cent. on $50,000 Erie R. R. Co. Prior Lien Bonds..............	2,000.00	
4 per cent. on $59,000 Erie R. R. Co. Penn. Collateral Trust Bonds.	2,360.00	
4 per cent. on $50,000 Reading R. R. Co. Jersey Central Collateral Trust Bonds..........................	2,000.00	
4 per cent. on $24,000 Nor. Pacific R. R. Co. St. Paul & Duluth Div. Bonds..........................	960.00	
4 per cent. $30,000 Nor. Pacific-Gt. Northern C. B. & Q. Collateral Trust Bonds....................	1,200.00	13,270.00
Annual Dues................................		8,820.00
Interest at 3 per cent. on balances on deposit with J. P. Morgan & Co.........		358.34
Proceeds sales of merchandise............		75.40
Proceeds sales of Publications		97.53

Life Membership Fees			250.00
Fellowship Members, Fees			300.00
Sustaining Members, Fees			325.00
Tuition Fees, credited to Students' Research Fund			105.00
Subscriptions to "North American Flora" credited to income of David Lydig Fund			379.54
Contributions to Special Book Fund			200.00
Contributions to Exploration Fund			550.00
Contributions to Museum and Herbarium Fund			2,550.00
			162,672.68

Disbursements

Expenses paid through Director-in-Chief account City Appropriations	$122,042.98		
On general account for vouchers paid	21,644.82	143,687.80	
Purchase of Mitten Herbarium, account Museum and Herbarium Fund		2,224.57	
Lectures and Literature on Preservation of Native Flora, account Income of Stokes Funds		30.22	
Books, account Special Book Fund		775.37	
Specimens, etc., account Exploration Fund		177.25	
Publications, account Income of David Lydig Fund		1,041.37	
Income of Students' Research Fund — Grants		200.00	148,136.58
Balance, Cash in Hands of Treasurer			14,536.10

Ledger Balances, December 31, 1906

Credit

Permanent Funds:

Endowment Fund	$270,910.00
Fellowship Fees	11,000.00

Life Membership Fees.................		18,250.00
Students' Research Fund..............		2,664.50
David Lydig Fund — Bequest of Chas P. Daly......................		34,149.86
Stokes Fund.............................		3,000.00
Temporary Funds:		
Special Book Fund, for Library.....		133.44
Conservatory Fund, for Plants.......		28.38
Exploration Fund		603.32
Museum and Herbarium Fund, for Specimens.........................		337.24
Income Students' Research Fund...		228.14
Income Stokes Fund		239.13
Income David Lydig Fund..........		776.08
Debit		
Investments:		
Net cost of $50,000 Ches. and Ohio Ry. Co. Genl. Mtge. Bonds.....................		
$50,000 Southern Ry. Co. 1st Consol. Mtge. Bonds.........		
$50,000 Erie R. R. Co. Prior Lien Bonds.		
$59,000 Erie R.R. Penn. Coll. Trust Bonds...................	$302,611.68	
$50,000 Reading R. R. Co. Jersey Cent. Coll. Trust Bonds...........................		
$24,000 N. Pacific R. R. Co. St. Paul & Duluth Div. Bonds		
$30,000 N. Pacific-Gt. Northern C. B. & Q. Coll. Tr. Bonds		
Director-in-Chief, Working Fund..	25,000.00	
General Income Account, Balance borrowed from Permanent Funds	172.31	
Cash in hands of Treasurer.....	14,536.10	
	$342,320.09	$342,320.0

No. 66 Broadway,
New York City, January 29, 1907

Dr. N. L. Britton,
Director-in-Chief,
New York Botanical Garden,
Bronx Park, New York.

My dear Dr. Britton: In response to your recent letter, I enclose herewith, for your files, the certificates of the Special Auditor, certifying to the correctness of the financial books and accounts of the Treasurer and of the Director-in-Chief, for the year 1906.

Yours very truly,
James A. Scrymser,
Chairman Finance Committee,
New York Botanical Garden.

No. 66 Broadway,
New York, January 29, 1907.

James A. Scrymser, Esquire,
Chairman of the Finance Committee,
New York Botanical Garden,
New York City.

Sir: This is to certify that I have, by your direction, examined the books and accounts of the Treasurer of the New York Botanical Garden for the year nineteen hundred and six (1906) together with their proper vouchers, and that I find the balance sheet and the treasurer's statement of receipts and disbursements, attached hereto, to be correct.

I have, also, examined the various investments and find the same to be as reported in the said balance sheet.

Respectfully submitted,
J. L. Merrill,
Special Auditor.

BULLETIN

OF

The New York Botanical Garden

Vol. 5. No. 18.

BOTANICAL CONTRIBUTIONS

Contributions to the Flora of the Bahama Islands. IV *

BY N. L. BRITTON

Zamia lucayana sp. nov.

Caudex stout, subfusiform, about 3 dm. long, 1 dm. thick, two thirds buried in the ground. Leaves glabrous, about 1 m. long; petiole obtusely angled, 3–4 dm. long; rachis somewhat angled; leaf-segments about 14 on each side of the rachis, spreading nearly at right angles, 17–21 cm. long, 2–2.7 cm. wide, 4–5 cm. apart, linear-oblong, obtuse, or irregularly rounded or subtruncate, and finely sparingly toothed at the apex, falcately narrowed at the base, the margins thickened and slightly revolute, the 40–45 nerves closely parallel. Fruiting peduncle about 4 cm. long, 1.2 cm. thick below, 2 cm. thick at the top, densely pubescent; fruiting strobile oblong, puberulent, 7 cm. long, 4 cm. in diameter, its acute conic tip 8 mm. high, its scales oblong, hexagonal, about 1.5 cm. wide and 8 mm. high.

In a sandy coastal thicket, Clarence Town, Long Island, only one plant found after long search (*Britton & Millspaugh 6271*).

ZAMIA ANGUSTIFOLIA Jacq.

This species, described by Jacquin from plants grown from Bahama seeds, but apparently not since obtained by botanists from the Bahamas, occurs sparingly in "white lands" between the Glass Window and Gregory Town, Eleuthera (*Britton & Millspaugh 5418*). It is said by the natives to grow elsewhere on Eleuthera, but is apparently local in distribution.

LEMNA MINOR L.

In sink holes and water holes near The Bight, Cat Island (*Britton & Millspaugh 5800, 5886*). Not hitherto known from

* Continued from Volume 4, page 143.

the Bahamas. Determined at the Missouri Botanical Garden by Mr. C. H. Thompson.

Ibidium lucayanum sp. nov.

Root of several cylindric, fleshy tubers 2–5 cm. long, 8–10 mm. thick. Basal leaves present at flowering time, oblong-lanceolate, oblanceolate to elliptic, thin but somewhat fleshy, spreading, 5-nerved, rather conspicuously reticulate-veined, at least when dry, 5–17 cm. long, 1–3 cm. wide, acute at the apex, narrowed at the base into a rather slender petiole, which is one half to two thirds the length of the blade; scape slender, including the spike 2–4 dm. high, its several leaves linear or linear-lanceolate, acute or acuminate, erect, appressed, somewhat clasping, 1–3 cm. long; spike quite dense or rather loose, 5–25 cm. long, about 1 cm. thick, usually many-flowered; bracts lanceolate, acuminate, erect, as long as the ovary or longer; flowers green, spreading; sepals linear-lanceolate, acutish, 3–4.5 mm. long; petals linear, a little shorter than the sepals; lip ovate-oblong, obtusish, concave, 3–5 mm. long, about one third as wide as long, with two minute callosities at the base; capsule oblong, blunt, about 5 mm. long.

Lignum Vitæ Cay, in high coppice (*Britton & Millspaugh 2316*); Great Exuma, in low coppice near Rolletown (*Britton & Millspaugh 3077*, type); Eleuthera, in white lands between Glass Window and Gregory Town (*Britton & Millspaugh 5413*), roadside in coppice near Governor's Harbor (*Britton & Millspaugh 5469*); coppice, Eleuthera Point (*Britton & Millspaugh 5633*); Cat Island, in coastal thicket, Port Howe (*Britton & Millspaugh, 5953*); Long Island, in coastal thicket (*Britton & Millspaugh 6278*); edge of coppice near Clarence Town (*Britton & Millspaugh 6344*); Watling's Island, in rocky coppice (*Britton & Millspaugh 6110*); Crooked Island, in leaf-mould, Jingo Hill (*Brace 4760*); road to Stopper Hill (*Brace 4798*); Andros: Deep Creek, basal leaves only (*Brace 5277*).

The species is related to the Mexican *Spiranthes polyantha* Reichenb. f., which has a narrowly lanceolate acuminate lip.

Pilea deltoidea Liebm.

Rock Sound, Eleuthera (*Britton & Millspaugh 5588*); vicinity of Clarence Town, Long Island (*Britton & Millspaugh 6273, 6314*); Spring Point, Acklin's Island (*Brace 4259*). The same as *Wright 1458* from eastern Cuba, referred to this species by Weddell. In the Bahamas this diminutive species inhabits moist soil and crevices of rocks, sometimes carpeting the surface; it is only slightly succulent. The species was collected on Key West many

years ago by *Blodgett* and referred by Dr. Chapman in his Flora of the Southern States to *P. herniarioides* (Sw.) Lindl., which, according to Weddell, is a form of *P. microphylla* (L.) Liebm.; it has also been collected on Key West by *Simpson* (*no. 480*), and is the *Adicea herniarioides* of Dr. Small's Flora.

VILLAMILLA OCTANDRA (L.) Hook. f.

Climbing on trees about a ruined house, near The Bight, Cat Island (*Britton & Millspaugh 5934*).

SESUVIUM MICROPHYLLUM Willd.

In a salina, Grand Turk (*Nash & Taylor 3878*). Apparently the same as the Cuban plant as shown by specimens from Havana (*Curtiss 569*); Matanzas (*Britton & Shafer 22*); Santiago (*Hamilton 36*). Certainly distinct from *S. Portulacastrum.*

CORONOPUS DIDYMUS (L.) J. E. Smith.

Waste places along the streets of the settlement at Rock Sound, Eleuthera (*Britton & Millspaugh 5558*). Hitherto known from the Bahamas only on New Providence.

CISSAMPELOS TOMENTOSA DC.

Road to Louisa Coppice, near Nicholl's Town, Andros, very local (*Brace 6897*); old fields near Nicholl's Town (*Brace 6716*).

DOLICHOLUS RETICULATUS (Sw.) Millsp.

Scrub lands between Graham's Harbor and Cockburn Town, Watling's Island (*Britton & Millspaugh 6212*); not otherwise reported from the Bahamas.

SPATHELIA VERNICOSA Planch. Lond. Jour. Bot. 5: 581. 1846.

This very interesting small tree was observed at two places on Cat Island, viz., on a rocky plain at Orange Creek (*Britton & Millspaugh 5782*), and in rocky soil on Bone Fish Point northwest of the Bight settlement. Col. Prain has kindly verified my determination of the species, which was described from flowering specimens collected by Linden in Cuba. Our specimens are fruiting, the 3-winged fruit 1 cm. long, much smaller than that of the Jamaican *S. simplex* L., the generic type; the leaflets are more distinctly veined than Planchon's description of Linden's specimens indicates, otherwise his description covers the Cat Island plants accurately. As seen by us *S. vernicosa* is a slender tree about 5 m. high, the unbranched stems about 2.5 cm. in diameter dying after flowering. The third species of the genus, *S. glabrescens* Planch.

loc. cit., described from foliage collected by Dr. Distan in Jamaica, grows in the Cockpit country of that island, as seen by Mr. Harris and by me in September, 1906 (*Britton 608*), at which time leaves were obtained from a tree about 20 m. high; and also on the Santa Cruz mountains, where we observed it in September, 1907, and obtained the fruit (*Britton 1111*).

Badiera oblongata sp. nov.

A shrub, 1.5 m. high, or less, with long slender appressed-puberulent branches. Leaves coriaceous, dull, 1.7–3 cm. long, 0.8–1.8 cm. wide, oblong or obovate-oblong, somewhat revolute-margined in drying, the midvein rather prominent, the lateral veins few and inconspicuous, sparingly pubescent with short appressed hairs on both sides when young, becoming glabrous or nearly so when old, rather bright-green above, pale-green beneath, acute at the base, obtuse or emarginate at the apex, the pubescent petioles about 2 mm. long; flowers clustered in the axils, puberulent, on pedicels 2 mm. long or less; exterior sepals about 0.7 mm. long, suborbicular, green; corolla white, about 2.5 mm. long; carina unguiculate, obtuse; capsule nearly triangular, shallowly emarginate, about 8 mm. long and wide, subacute at the base.

New Providence: Coppice, north slope of Blue Hills (September 6, 1904, *Britton & Brace 578*, type); Andros: Border of mangrove swamp, Deep Creek (*Brace 5178*); coppice near Nicholl's Town (*Brace 6876*); Cat Island: Coppice, Orange Creek (*Britton & Millspaugh 5753*); stony scrubland, The Bight (*Britton & Millspaugh 5894*); Acklin's Island: Spring Point (*Brace 4359*); Crooked Island: Near Marine View Hill (*Brace 4696*); slopes of Jingo Hill (*Brace 4764*).

The species is nearest related to the Cuban plant represented by *C. Wright 115*, cited by Professor Chodat in his monograph of Polygalaceae under *Polygala diversifolia* L. (*Badiera diversifolia* DC.), the Jamaica species.

In his Monographia Polygalacearum, published in Mém. Soc. Phys. Hist. Nat. Genève 31^2: 11, Professor Chodat describes the Jamaica species as new (*Polygala jamaicensis*), basing it on a specimen collected by Mr. J. H. Hart in the island of Jamaica (Bot. Dept. Jam. *no. 641*). An examination of the cotype contained in the herbarium of the Department of Public Gardens and Plantations of Jamaica shows that this is a widely distributed plant of that island, and also shows that it is identical with the plant figured by P. Browne, Hist. Jam., *pl. 5, f. 3*. Professor Chodat, however,

cites this plate of Brown under his description of *Polygala diversifolia* L.

In the original description (Sp. Pl. 703) Linnaeus simply indicates the habitat of the species in Tropical America, but in taking up the genus *Badiera*, de Candolle (Prodr. 1: 334) certainly identifies the plate of Brown with the Linnaean species. With this evidence at hand, it appears to me that *Polygala jamaicensis* of Chodat is a synonym of *Polygala diversifolia* L. Professor Chodat cites Cuban specimens collected by Wright under *P. diversifolia*, but these are clearly all different from the Jamaica species and it is unlikely that Linnaeus had the Cuban plant before him, and if my solution of the problem is correct, the Cuban species is without a name, unless it be the same as the Bahama plant above described; more specimens of it are needed to determine this point.

COLUBRINA CUBENSIS Brongn.

Pleasant Hill, near Nicholl's Town, Andros (*Brace 6898*); near Nicholl's Town (*Brace 6714*).

ABUTILON LIGNOSUM (Cav.) Rich.

Waste places, Clarence Town, Long Island (*Britton & Millspaugh 6265*); Harbor Island, Eleuthera (*E. G. Britton 6385*).

Passiflora bahamensis sp. nov.

Stems slender, purple, usually trailing, sometimes climbing on low shrubs, 0.5–1.5 m. long. Tendrils at nearly every node, wiry, mostly as long as the leaves or longer; petioles 1–3 cm. long, bearing scattered stalked glands, rarely glandless; stipules small, glandular-fimbriate; leaf-blades firm in texture, panduriform, 17 cm. long, or less, 3-lobed, cordate at the base with a widely opened or nearly closed sinus, shining above, dull beneath, the basal lobes rounded or somewhat angled, one fourth to one half as long as the acute middle one, the margin with stalked glandular hairs all around; peduncles glabrous, longer than the petioles, sometimes as long as the leaves; involucre-segments bipinnatisect, 2–3 cm. long, with very numerous stalked glands; calyx-segments ovate-lanceolate, acute; petals ovate-oblong, about 2 cm. long; crown purple, its outer segments about three fourths as long as the petals; berry globose, about 2 cm. in diameter, bright-red and shining when ripe, its stalk above the persistent involucre 6–8 mm. long; seeds oblong, rough, 4 mm. long.

NEW PROVIDENCE: On limestone, South Side Road (August 31, 1904, *Britton & Brace 392*, type); Blue Hills Road (*Britton 55*); near Nassau (*Curtiss 209*); Killarney pine barrens (*Coker 70*); Wolf Road (*Britton & Millspaugh 2102*); ANDROS: (*Northrop*

(*91; Brace 5191, 5022, 6861, 7101*); CAT ISLAND: The Bight (*Britton & Millspaugh 5833*).

This species has been referred to both *P. ciliata* Ait. and to *P. pectinata* Griseb. Among our collections it comes nearest to the Cuban plant illustrated by C. Wright's *no. 2601*, called *P. ciliata*, but differs markedly in foliage, by its smaller fruit, and by its purple stems. I have twice seen the Cuban plant growing: at Madruga (*Britton & Shafer 675*), and at Matanzas (*Britton & Wilson 427*). This does not appear to be the true *ciliata* of Aiton, which is probably only a form of *P. foetida* L. It differs altogether from *P. pectinata* Griseb., of the eastern and southern Bahamas, which has nearly or quite unlobed, thin, ovate, crenate leaves, flowers twice as large, oval fruit, and very few glands except on the involucre. The distribution of *P. pectinata* is illustrated by the following specimens, additional to those recorded in Bull. N. Y. Bot. Gard. 4: 121:

Little San Salvador (*Britton & Millspaugh 5665*); Cat Island (*Britton & Millspaugh 5926*); Conception Island (*Britton & Millspaugh 5988*); Crooked Island (*Brace 4609*); Acklin's Island (*Brace 4477*); Long Cay [Fortune Island] (*Brace 4090*); Grand Turk (*Nash & Taylor 3804*).

CASEARIA ALBA A. Rich.

Waterloo coppice, New Providence (*Britton & Brace 720; Brace 5336, 7151*). Identification based on *Wright 1890*, so determined by Grisebach. A long woody vine with widely diverging branches.

MENTZELIA FLORIDANA Nutt.

In sandy soil, Governor's Harbor, Eleuthera (*Britton & Millspaugh 5516*); new to the Bahamas.

Urechites lutea (L.).

Vinca lutea L. Cent. Pl. 2: 12. 1756.
Echites Catesbaei G. Don, Gen. Hist. 4: 74. 1838.
Echites Andrewsii Chapm. Fl. S. U. S. 359. 1860.
Urechites Andrewsii Small, Fl. SE. U. S. 937. 1903.

Vinca lutea of Linnaeus is based wholly on Catesby's "Apocynum scandens salicis folio flore amplo pleno" (Catesby, Car. 2: 53, *pl. 53*); the illustration is crude, but unmistakable for a common vine of the Bahama Islands.

GREAT BAHAMA (*Britton & Millspaugh 2441; Brace 3601*); ABACO (*Brace 1578, 1489*); GREAT STURRUP CAY (*Britton & Millspaugh 2278*); NEW PROVIDENCE (*Cooper 67; Curtiss 172; Coker 81; Britton 107; Britton & Brace 190*); ANDROS (*Northrop 522a*); ELEUTHERA (*E. G. Britton 6528*); CAVE CAY (*Britton & Millspaugh 2822*); LONG CAY (*Brace 4042*). ACKLIN'S ISLAND (*Brace 4273, 4364*); WATLING'S ISLAND (*Britton & Millspaugh 6073, 6093*); INAGUA (*Nash & Taylor 885, 897, 898*); LITTLE INAGUA (*Nash & Taylor 1194*); GRAND TURK (*Nash & Taylor 3773*). Frequent on the Keys of Florida. The Cuban and Jamaican *E. neriandra* Griseb. seems to be the same species, which varies greatly in pubescence, contiguous vines being either glabrous or almost velvety.

Rochefortia bahamensis sp. nov.

A shrub or small tree up to 4 m. high, with a trunk 6 dm. thick, the bark scaly, the branches spreading, the twigs grey-green, flexuous, sometimes with spines 4–6 mm. long at the nodes. Young foliage sparingly puberulent, soon glabrous; leaves coriaceous, obovate to orbicular, 2–6 cm. long, obtuse or emarginate at the apex, obtuse to cuneate at the base, the midvein prominent, the few lateral veins inconspicuous, the upper surface dark-green and dull or faintly shining, the under surface somewhat lighter green, the petioles 2–10 mm. long, green or yellowish; cymes axillary, 2–4-flowered, their peduncles pubescent, 5 mm. long or less; calyx sparingly pubescent, obconic, about 4 mm. long, its 5 lobes nearly orbicular, ciliate; corolla greenish-white, 6 mm. long, cleft to about the middle, its lobes oblong, obtuse; filaments about as long as the anthers; ovary ovoid, about 3 mm. long, the two styles erect or a little incurved.

Scrub lands near Lighthouse, Watling's Island (*Britton & Millspaugh 6167, type*); rocky coppice between lakes, Watling's Island (*Britton & Millspaugh 6146*); Gnu Bluff, Crooked Island (*Brace 4744*); Road to South Side, Long Cay (*Brace 4109*). Nearest to *R. cuneata* Sw.

TOURNEFORTIA TOMENTOSA Mill.

Governor's Harbor, Eleuthera (*Britton & Millspaugh 5445*); near Orange Creek, Cat Island (*Britton & Millspaugh 5728*); Albert Town, Long Cay (*Brace 4129*).

SALVIA COCCINEA L.

Naturalized along roadsides, Cockburn Town, Watling Island (*Britton & Millspaugh 6044*).

JUSTICIA CARTHAGINENSIS Jacq.

Naturalized in waste places, Clarence Town, Long Island (*Britton & Millspaugh 6269*).

GENIPA CLUSIIFOLIA (Jacq.) Griseb.

The leaves of shoots of this species, springing from cut stumps, are narrowly oblanceolate to narrowly oblong-oblanceolate, acute or acuminate, only 2 cm. wide or less, differing so greatly from the normal foliage that unless one had seen them growing it could scarcely be believed that they belonged to the plant. Specimens of these narrow shoot-leaves are seen in *Brace 4766*, from Crooked Island, and *Britton & Millspaugh 5658*, from Little San Salvador.

Tetranthus bahamensis sp. nov.

Stems smooth, slender, creeping, 3–6 cm. long, the nodes 1.15 cm. apart. Leaves ovate, about 4 mm. long and 3 mm. wide, obtuse at the apex, rounded or subcordate at the base, glabrous on both sides, the veins very obscure, the petioles about 3 mm. long, sparingly pilose; heads solitary, 4-flowered, on sparingly pilose peduncles, about 1 cm. long; involucrate bracts 4, obovate, about 1.5 mm. long, and 1 mm. wide, 3-nerved, sparingly pilose without and slightly ciliate; corolla about 1 mm. long, glabrous, the lobes slightly shorter than the tube; anthers large, apiculate; style glabrous, 0.5 mm. long, its branches glandular-pilose; achenes bluntly quadrangular, glabrous, 0.5 mm. long.

Spring Point, Acklin's Island (*Brace 4246*).

This, the third known species of the genus, is apparently most nearly related to *T. hirsutus* Sprengel of Santo Domingo.

The Elgin Botanical Garden, its Later History, and Relation to Columbia College and the Vermont Land Controversy.

By Addison Brown.

A century ago, the Elgin Botanical Garden, opposite the present Cathedral at Fifth Avenue and Fiftieth Street, was the pride of the New Yorkers of that day. It was the first establishment of the kind in this State, and was regarded as a marvel of the skill, zeal and munificence of Dr. David Hosack, who had created it. Something of the romantic interest that originally attached to it has descended to our own times, though as a botanical garden it has long since disappeared. Its history up to January, 1811, when Dr. Hosack conveyed it to the State, is pretty fully told by him in his "Statement of Facts," etc., concerning it, published in March, 1811,* from which most of the subsequent notices of it are drawn, and there end. Nor have I been able to find any consecutive account of the use and management of the garden after that date, or of its decline and extinction. Such facts as have been learned will supplement, in some measure, the early narratives.

Latterly also some errors have crept into current accounts. In a recent address, the site of the garden is incorrectly given.† A common impression also has been that Columbia College received the property from the State in 1814 under an obligation to maintain it as a botanical garden; though released from that duty by Ch. 19 of the Laws of 1819. Lossing states this explicitly.‡ The same idea is expressed in the Columbia University Quarterly.§ In Torreya (*loc. cit.*) it is said that in Columbia's hands the use of the grounds "was *diverted* from that of a botanical garden to highly profitable rentals."

* Published apparently to correct some errors and misrepresentations about its sale to the State. An earlier and much briefer Descriptive Tract, without date, containing some additional particulars, may be found in the N. Y. Historical Society, and in Med. Repository, 13 : 292. 1810.

† Torreya, 6 : 104, 105. 1906.

‡ Hist. of N. Y. City, 146. 1884.

§ 5 : 279. 1903.

More common is the statement, unknown, so far as I can find, for forty years after the gift to Columbia, that the grant of the Garden to her in 1814 was made as a "*reimbursement*" or "compensation" to Columbia for her lands in Vermont, "ceded" by New York to that State by the treaty of 1790.* It has even been called an "*exchange*."†

These expressions, I think, are all misconceptions having no valid basis. It is desirable that the facts derived from records and documents bearing on these points should be brought together, both from their inherent interest and their connection with a striking episode in our colonial and revolutionary history.

Something, however, should be premised of the eminent man by whom the Elgin Garden was founded. His father, Alexander Hosack, was born at Elgin (for which the garden was named) in Scotland, in 1736. In 1758 he came with Gen. Jeffrey Amherst, as an artillery officer, to the siege and capture of Louisberg, and afterward settled in New York, where he married Jane, daughter of Francis Arden, a prominent New York merchant. David Hosack was their oldest son, born August 31, 1769. He was for two and one half years a pupil of Columbia, but completed his college course in 1789 at Princeton.

He received his medical degrees at the University of Pennsylvania in 1791, and at Edinburgh in 1793, studying there and in London from 1792 to 1794, where he met many scientific men.

"One day," he writes, "while walking in the garden of Prof. Hamilton, near Edinburgh, I was very much mortified by my ignorance of botany, with which his other guests were familiar, and I resolved to acquire a knowledge of that department of science."‡

He was soon pursuing botany diligently under Curtis in his botanical garden at Brompton, and afterwards with Sir

* New Internat. Encycl., 5 : 49. 1903 ; Van Amringe, Hist. Columbia Col., 67. 1876.

† Columbia Univ. Quart., 5 : 279. 1903 ; King's Handbook of N. Y., 272. 1893.

‡ Dr. A. E. Hosack in Gross' Amer. Med. Biog., 1 : 297, 298. 1860.

James E. Smith, president of the Linnean Society, who became a life-long friend.

On his return to New York, Dr. Hosack took with him the first considerable cabinet of minerals brought to this country, and also duplicates of the herbarium of Linnaeus, afterwards given by him to the Lyceum of Natural History, but since destroyed by fire.

In 1795 he was made professor of botany in Columbia College, and in 1797, of *materia medica* also, which chairs he retained until 1811, when he resigned, on being made professor of *materia medica* and clinical medicine in the College of Physicians and Surgeons, which he held until 1826.* In that year he, with Dr. Mott, Dr. Francis and others, resigned, through dissatisfaction with the government of that institution, and formed the Rutgers Medical College, with Dr. Hosack as president of the faculty.† The new school was very prosperous until the state interfered in 1830 and gave such advantages to the College of Physicians and Surgeons as caused Rutgers to be abandoned, though without immediate advantages to its older competitor.‡ Dr. Hosack did not afterwards engage in public instruction. He died December 23, 1835, from apoplexy caused by exposure to extreme cold.

The above engagements form but a small part of Dr. Hosack's activities. In 1796 he became a partner of Dr. Samuel Bard, who in 1798 retired to the country at Hyde Park § (where Dr. Hosack afterwards had a summer residence), leaving Dr. Hosack in the enjoyment of a large and lucrative practice. He became, says Dr. Francis, for thirty years the leading practitioner of his time. For twenty years he was one of the physicians of the New York Hospital. He attended Hamilton at his fatal meeting with Burr, July 11, 1804, and the following day until his death.

---

* Pres. Barnard, Ann. Rept. 1878 : 39.

† Hosack, Inaug. Address, Rutg. Med. Col., 1826.

‡ Dr. Francis in S. W. Williams' Amer. Med. Biog., 276. 1843; Gross' Amer. Med. Biog., 295–317. 1860 — the best sketches of Dr. Hosack's life that I have met, though they make but little mention of the Elgin Garden.

§ Dr. Ducachet in Amer. Med. Recorder, 4 : 609.

It is a mark of Dr. Hosack's magnanimity of character, that though like Hamilton's other friends he probably regarded Col. Burr as little better than Hamilton's murderer, he nevertheless, four years afterward, when Burr, acquitted of treason, was in hiding in New York, seeking shelter from universal and overwhelming obloquy, supplied him with necessary passage money to effect his escape to Europe.*

Dr. Hosack was one of the leaders in establishing the College of Physicians and Surgeons in 1807,† where he was professor of botany from 1807 to 1808, when he resigned. He was one of the organizers of the New York Historical Society, and for eight years its president, and for several years president of the New York Horticultural Society. Bellevue Hospital and the Humane Society were established "mainly by his persevering exertions."‡ He was a fellow of the American Literary and Philosophical Society, and of the Edinburgh and London Royal Societies.

He was large and robust of frame, of commanding presence and a piercing eye. His ideas and his views were also large and broad. He had a facile and elegant pen. From 1814 to 1824 he edited, with Dr. Mitchill, The American Medical and Philosophical Register (4 vols.), and his writings were numerous — medical, literary and biographical, including memoirs of Dr. Hugh Williamson and Gov. De Witt Clinton.

"His ardent temperament," says Dr. Dalton,§ "and undoubting self-reliance led him to the front in many controversial discussions, and his views were always maintained with force and ability. His sonorous voice, impressive manner and changing expression of face, gestures and utterance held attention."

"Hosack was a man of profuse expenditure," says Dr. Francis; "had he the wealth of Astor he might have died poor. . . . It was his general rule to terminate his spring

* Lamb's Hist. of N. Y., 2: 540.

† Hist. Columbia Un., 316. 1904; Gross' Amer. Med. Biog., 316. 1860.

‡ Lossing's Hist. New York City, 1: 115. 1884.

§ Dalton's Hist. Col. Phys. and S., 39, 40. 1888.

course of botanical lectures by a strawberry festival, . . . to be practical as well as theoretical." "The disciples of the illustrious Swede must have a foretaste of them," he said, "if they cost me a dollar a piece." * His character and social position are thus summarized:

"In all prominent movements concerned with the arts, the drama, literature, medicine, city improvements or state affairs, Dr. Hosack bore a conspicuous part; . . . he was distinguished beyond all rivals in the art of healing; universally acknowledged, also, to have been the most eloquent and impressive teacher of scientific medicine and clinical practice this country had as yet produced. His manner was pleasing, and his descriptive powers and his diagnosis were the admiration of all. . . . His early efforts to establish a medical library in the New York Hospital, his coöperation with the numerous charities which glorify the metropolis, his primary formation of a mineralogical cabinet, his copious writings on fevers, quarantines and foreign pestilence . . . and his adventurous outlay in establishing the botanical garden, evinced the lofty aspirations which marked his whole career as a citizen. It was a frequent remark in New York during his lifetime that Clinton, Hosack and Hobart were the tripod upon which the City stood.

"Through his fondness for society he exerted a strong personal influence. He gave Saturday evening parties, and, surrounded by his large and costly library and his works of art, there never was a more genial and captivating host. Great divines, jurists, etc., . . . and distinguished foreigners were summoned to his entertainments and charmed with his liberal hospitality. His home was the resort of the learned and enlightened from every part of the world. No European traveller rested satisfied without a personal interview with Dr. Hosack; . . . the Duke of Saxe Weimar mentions in his diary the social prominence of the Hosack Saturday evenings."

His son, Alexander Eddy Hosack, was a surgeon of distinction, who died at Newport, R. I., in March, 1871; his widow bequeathed $70,000 for the Main Hall in the New York Academy of Medicine, where a tablet commemorates

* Dr. Francis' Old New York, 30–31; 84, 85; Lamb's Hist. N. Y., 2: 581–583.

his memory. His botanical library has been given by that institution to the New York Botanical Garden in Bronx Park.

The Founding of the Garden.

Soon after his appointment in 1798, Dr. Hosack desired Columbia College to apply a small sum annually for a botanical garden, as an aid in the study of *materia medica*. A committee recommended £300 annually; but the trustees disallowed it for lack of funds. In 1800 he applied to the state legislature to aid in the same project, but without success. He then determined to undertake the work with his own means, trusting that when developed the garden would command public support.

Accordingly in 1801 he bought of the city four plots of the "common lands" (Nos. 54, 55, 60 and 61) in all about twenty acres, or 256 city lots, extending from 47th Street to 51st Street and from Middle Road (now Fifth Ave.) westward to a line about 100 feet east of Sixth Avenue. The deed was dated and executed by Mayor De Witt Clinton August 6, 1804. It conveyed to David Hosack the above four plots for $4,807.36 in money, and a quit rent of sixteen bushels of good merchantable wheat to be paid every May 1 in kind, or its equivalent in gold or silver coin.* These quit rents were in 1810 commuted and released for $285.71; and in exchange for the city's rights in the streets through the four lots, he conveyed to the city in December, 1810, plot No. 84 of the common lands, of about five acres on 57th Street.† As the garden work was begun in 1801, probably that was the date of the purchase and first part payment, the deed in 1804 being given on the complete payment of the price.

The development of the garden was pushed forward with the energy and success of an enthusiast. Dr. Hosack's acquaintance with scientific men abroad greatly aided him in obtaining plants, seeds, shrubs and trees from every quarter. By 1806 the grounds, he says, were mostly under cultivation,

---

* Recorded in Comptroller's office, Vol. 1, fol. 62.

† Deed dated December 31, 1810. Recorded in Reg. office, Liber 323, p. 534.

having about 2,000 species of plants, with one spacious green-house and two hot-houses, presenting a frontage of 180 feet. The plots devoted to plants were encircled by shrubs and trees; and the whole ground enclosed by a stone wall seven feet high and two and one half feet thick. Pursh was for a number of years the curator.

The early descriptive tract above referred to says:

"A nursery is also begun for the purpose of introducing into this country the choicest fruits of the table, . . . which the proprietor has been enabled to procure from various parts of the world, and from which the establishment *will hereafter derive one of the principal sources of its support*" — an expectation which, of course, was but slightly realized.

Dr. Francis in his "Old New York" (pp. 28–29) says:

"In 1807 the garden was a triumph of individual zeal, ambition and liberality, of which our citizens had reason to be proud. The eminent projector of this garden, with princely munificence, had made these grounds a resort for the admirers of Nature's vegetable wonders and for the students of her mysteries." *

The Sale to the State. — Dr. Hosack's expenditures upon the garden, according to his "*Statement*" (p. 56), must have exceeded $100,000. Unable to sustain this burden, and disappointed in his appeals to the Legislature for support in 1805 and 1806, he was compelled in 1808 to offer the garden for sale. Upon the advice of many friends, in order to preserve it from extinction, he petitioned the Legislature in 1808 and again in 1809 to purchase and maintain it as an aid in medical education. Failing in the latter year by only six votes, the petition was renewed in 1810, supported by special memorials from the mayor, the common council of the city, the governors of the New York Hospital, the County Medical Society and five other medical societies of the state, and by many of the most prominent citizens and numerous medical

* Soon after the garden was established, the site of the present cathedral at 50th Street was purchased for the Jesuit College, the garden opposite being one of the attractions to that block. That college was carried on for a number of years. See U. S. Catholic Soc. Hist. Records, 4: 329–334. 1906.

students. The medical faculty of the College of Physicians and Surgeons also favored the petition; but the censors and trustees strongly opposed it, because of the distance of the garden from the college (three and one half miles) and of its subordinate importance in medical education. The trustees of Columbia also declined to lend their support.* It is not improbable that an additional reason for not joining in the application was that it might naturally obstruct further grants of patronage to themselves, which both colleges greatly needed for other purposes.

After much debate, a bill was passed March 12, 1810, by a small majority authorizing the purchase and a lottery to raise money to pay for it. The act was entitled an "Act for promoting Medical Science in the State of New York." It directed the fair value of the land and improvements, excluding the plants, to be ascertained by commissioners and paid from the proceeds of the lottery. Appraisers fixed this value at $74,268.75; the land and wall being rated at $2,500 per acre, and the buildings at $24,300, and the plants at $12,635. Dr. Hosack accepted the terms of the act though the compensation was $28,000 less than his outlay; and having, as required, cleared the title of claims for quit rents and street rights, he conveyed the grounds, buildings and plants to the People of the State by deed dated January 3, and filed in the office of the Secretary of State, January 14, 1811.†

*See Exposition of the Transactions of the College of Physicians and Surgeons, 16–21. 1812. This pamphlet exhibits the bitter feeling which at that time existed between the two medical schools, which were soon afterward united. At page 18, an amusing satirical note after referring to the botanical garden as Dr. Hosack's "*country-seat*" and "*garden*," proceeds as follows:

"On the gate is now written, '2 Shillings admittance, excepting subscribers and purchasers.' . . . Money is drawn from the sale of plants and vegetables and the *pasturing of cattle*. *These animals*, to the number of 20 or 30, *attend the Botanical Garden* and excite the ridicule of travellers passing there."

† Several trust deeds in the nature of mortgages, executed soon afterwards by Dr. H. upon the expected proceeds of the Lottery, for the benefit of Nath. Pendleton, Brockholst Livingston and several others, show how considerably Dr. H. had been obliged to draw upon his friends in building up the Garden enterprize. (Liber 90, p. 524, February 23, 1811; Lib. 91, p. 74, March 5, 1811.)

The general interest apparently indicated by the wide support of Dr. Hosack's petition, led Dr. Mitchill in June, 1810, to open a course of popular botanical lectures at 12 Magazine (Pearl) Street; but though, as he says, "they were carefully arranged and well advertised, there was but a slight attendance — 15, 10, 4, and 9 persons at the first four lectures respectively, without a single course ticket sold, or a pupil engaged"; and the course was then abandoned. (Letter of Dr. M., June 19, 1810, in "Exposition etc. of Phys. and S." 21–23. 1812.)

Under the Regents and the College of Physicians and Surgeons, 1811 to 1816.

The Act of 1810 provided for the management of the Garden as follows: (Sect. VII.)

"The Regents shall from time to time make such orders and regulations relative to the keeping, *maintaining* and preserving the said botanical garden and the use and employment thereof for the *benefit of the Medical Schools* of this State as they shall judge most conducive to the public good; and they are hereby directed *to make such regulations and take such measures for the support of said establishment, that it shall be attended with no future charge or expense* to the State; *provided* that physicians and medical students shall at all times have access to it *free from any expense;* and *provided* that the People of this State shall have the right at all times to sell and dispose of said property in such way and for such purposes as they may deem expedient."

The regents being thus forbidden to incur any expense to the State, committed the garden in May 1811 to the management of the College of Physicians and Surgeons,

"to be kept and preserved in a condition fit for all medical purposes and open to medical students." *

Up to that time Dr. Hosack had continued to pay the garden expenses, † and the medical students of both colleges had enjoyed the privileges of the garden in botanical instruction. ‡

* Am. Med. and Phil. Reg., 2 : 4 ; 3 : 242 ; 4 : 117. 1811–1814 ; Regents' Rept., 1811, 1812. Notice and Act in Medical Repos., 14 : 373. 1811.

† Regents' Rept., January 12, 1812.

‡ Rept. to Regents by Col. Phys. and S., 1808.

In June, 1811, the garden was leased by the College of Physicians and Surgeons for five years to Michael Denison, Dr. Hosack's former gardener, whereby he agreed to keep it in good condition (after certain repairs by the College, costing $543.98) in consideration of his having the produce of it, reserving for the garden, under the College inspection, three plants of every species.* The buildings and the cultivation of herbaceous plants, as I surmise from the subsequent leases, were confined to the northeast part of the garden grounds, *i. e.*, north of 49th Street, and extending not over 450 feet westward from Fifth Avenue, the rest being used for shrubs, trees, nursery, crops and pasturage. The conservatories were between 50th and 51st Streets.

In 1811, the College of Physicians and Surgeons was reorganized by the Regents under a new charter. Dr. Hosack was called to the chair of materia medica and clinical medicine, and was largely instrumental in bringing about the union of the medical department of Columbia with the Physicians' College, which was completed in 1813–14.† Dr. Mitchill was professor of natural history including botany.

During the five years of Denison's tenancy, the College of Physicians and Surgeons had all the use of the garden that was desired. Dr. Mitchill "availed himself of its advantages." ‡ In 1812 Dr. Hosack gave the lectures on Botany, "and the State Botanical Garden," it was said, "gave the most ample opportunity for study." § In the *Syllabus of Courses* for 1814, it is said (p. 19)

"For practical lessons on genera and species, the grand establishment of Elgin . . . is visited as often as necessary." ‖

Differences, however, soon arose as respects the care and repair of the garden. Dr. Hosack reported in 1813 that repairs were much needed to fences, roads, cisterns, flues and

* Dalton's Hist. Col. Phys. and S., 46. 1888. Trustees' Min., June, 1811: 18, 35.

† Hist. Col. Phys. and S., 39, 40.

‡ Ibid., 46.

§ Amer. Med. & Phil. Reg., 3: 242.

‖ See Regents' Rep., 1814: 19.

conservatories, and that valuable plants had disappeared.* I judge that these defects were soon remedied, for the trustees reported to the regents in 1812, that the garden was then "in good condition," and in 1814, that "the grounds were cultivated with care and continue in the same state of preservation as before." "We have a valuable botanical garden," they say, "highly useful and conducive to the acquisition of knowledge in *Materia Medica*" (p. 10). In 1815 there were similar complaints of decadence.

After several years of trial, however, in consequence of the distance of the garden from the College, its need of constant supervision and frequent repair, and the expense, the difficulty of finding a responsible and faithful tenant, the lack of state support and the subordinate importance of the garden in medical study, made the grant of the garden grounds to Columbia College in 1814† a welcome relief to the trustees of the College of Physicians and Surgeons, though Dr. Hosack was loath to part with it. Three times afterwards, as stated below, he endeavored, without success, to renew his connection with the garden by obtaining a lease of it to societies with which he was associated; and in 1816 he petitioned the legislature, also without success, to bestow the garden upon the College of Physicians and Surgeons, giving to Columbia instead, its money value§ (post, pp. 334, 335).

When the garden was conveyed to the state, Dr. Hosack hoped it would remain a permanent institution under the state's support, as the Jardin des Plantes is maintained in Paris.‖ In that hope he had projected an enterprise, which, if carried out, would have been a permanent contribution to botanical science, but which, almost a century later, still remains unaccomplished. In his preface to the Elgin Catalogue (1811) he says:

* Dalton's Hist. Col. Phys. and S., 38. 1888. Trustees' Min. Col. Phys. and S., 1: 35, 36, 73–78, 114; 2: 33.

† Act of Ap. 13, 1814, Ch. 120.

‡ Prof. Lee in Hist. Columbia Un., 316. 1904.

§ Trustees' Min. Col. Phys. and S., 2: 73; Assembly Journal, 1816: 384.

‖ "But it was suffered to go to ruin." Gross' Amer. Med. Biog., 316.

"As soon as measures may be taken by the Regents of the University for the *permanent preservation* of the Botanic Garden, it is my intention immediately to commence the publication of *American Botany*, or a *Flora of the United States.* In this work it is my design to give descriptions of the plant, its uses, etc . . . to be *illustrated by a colored engraving* in the same manner in which the plants of Great Britain have been published by Dr. J. E. Smith. Considerable progress has already been made in obtaining materials for this publication" . . . "with drawings by James Inderwinck, a young gentleman of great genius and taste, and others by John [E] Le Conte Esq., and new collections by Mr. Pursh."

But the regents could not obtain the necessary public support. The time was not ripe for a botanical garden at the public charge; and the existing business and financial conditions, the losses and depression from the prolonged embargo, the war with England, the closing of the National Bank, followed by irresponsible banking and a depreciated currency, were all adverse to grants of money for such purposes. The transfer of the grounds to Columbia in 1814, without any provision for the maintenance or preservation of the garden, of necessity sealed its fate sooner or later, since Columbia was then too weak to need it or to sustain it.

THE GRANT TO COLUMBIA NOT CONDITIONED UPON THE MAINTENANCE OF A BOTANICAL GARDEN.

The act of 1814, by which this grant was made, was originally designed mainly for the benefit of Union College, and so it remained to the end; but four other institutions, including Columbia, were finally embraced in it. The act is entitled, "*An Act instituting a Lottery for the promotion of Literature and for other purposes.*" *

After providing for the lottery and for the payment from its proceeds of $200,000, to Union College, and $74,000 to other institutions, the sixth section enacted:

VI. "That all the right, title and interest of the People of the State in and to all that certain piece or parcel of land

* Laws, 1814, Ch. 120. For its preamble and provisions for other colleges see post, p. 341.

. . . situate in the 9th Ward of the City of New York known by the name of the Botanic Garden and lately conveyed to the People &c. by David Hosack, be and the same is hereby granted to and vested in the Trustees of Columbia College; but this grant is made upon the express *condition* that the college establishment shall be removed to the said tract of land hereby granted, or to lands adjacent thereto, within twelve years from this time."

The seventh section directed that

"The Trustees of the College, within 3 months shall transmit to the trustees of the other colleges of the State a list of the different kinds of plants, flowers and shrubs in the said garden, and within one year thereafter deliver at the said garden, if required, at least one healthy exotic flower, shrub or plant of each kind of which they shall have more than one at the time of application, together with the jar or vessel containing the same, to the trustees of each of the other colleges who shall apply therefor."

There are no other conditions in the act. The grant is not of a botanical garden *to be maintained as such.* Had that been the intention, it would have been so declared in the act, as was done in the direction to the regents in the act of 1810 (ante, p. 327). By the latter act the state reserved the right to dispose of the grounds as it should see fit; and by the act of 1814, it granted them to Columbia, upon no other condition than that of *removal*, as required by the above § 6.

The obligation to distribute *duplicates* of exotic plants to other colleges that might apply for them, was not a condition of the grant; and though it imposed an obligation to preserve such duplicates for a year after notice to the colleges, it did not require their preservation in any particular place; still less to perpetuate a botanical garden; and after the expiration of the year, no duty whatsoever under § 7 remained, if the duplicates were delivered, or not applied for. This very provision for the distribution of exotic duplicates, seems to contemplate the speedy discontinuance of the garden as a botanical institution, and the dispersal of its most valuable plants. Considering the great financial needs of the college as set forth in its petition of 1814,* and that the maintenance

* Hist. Columbia Un., 100. 1904.

of a botanical garden would much increase its burdens, as was well known to all, I have not the least doubt that the college was not expected to maintain it, except as it might see fit to do so for the purpose of sale or exchange; and that the provision as to duplicates was inserted on account of this expected disposal of the plants.

The required removal to the garden grounds within twelve years, was not compatible with the permanent maintenance of a botanical garden; for there were but 19¾ acres in all, and the college buildings, with suitable approaches, roads, yards, and a campus, would require so much of this space as not to leave sufficient for a botanical garden worthy of the name.

Thus all the provisions of the act of 1814, as well as the circumstances of the parties, so clearly negative any duty to perpetuate a botanical garden, that it is difficult to imagine how that idea gained currency.

The journals of the legislature do not show why *land*, instead of money, was given to Columbia. Dr. Vermilea states that Rev. Dr. Mason, Columbia's provost, who was representing her at Albany, "was *induced* to accept the garden and leave to Union the lotteries." *

The land-grant (§ 6) seems to have been an *amendment* by the senate and accepted as such by the assembly,† although possibly it was only the senate's amendment of § 6 that was returned for acceptance. The lotteries for Union College authorized in 1805, were not drawn until 1814, and fell $4,000 short of the authorized $80,000, ‡ and Union needed much more money for her buildings, which the lottery of 1814 was intended to provide. In 1805, when the former lotteries for Union were authorized, and again in 1806, Columbia had presented to the legislature urgent memorials for relief, essentially the same as her memorial in 1814, but obtained nothing; § and the same result might reasonably

* Wilson's Memorial Hist. of New York, 3 : 584. 1893.

† Assembly Journal, 1814 : 475.

‡ Van Sanford's Life of Dr. Mott, 140 : Laws, 1805, Ch. 62.

§ Trustees' Min. Columbia Col. 2 : 240, 252 ; Assembly Jour., 1806 : 131, 132; "Assembly Papers—Colleges" (Albany), pp. 75–113. Post, p. 367.

have been feared if she insisted on sharing in the lottery mainly designed for the new colleges. Columbia had already been considering the question of removal; * and the garden grounds would certainly be useful to her at some time, either for sale or for her own occupancy on removal; and her acceptance of the land instead of money would leave larger sums for the other institutions. Some such considerations, no doubt earnestly pressed, probably led to the reluctant acceptance by Dr. Mason of the disguised treasure, which the trustees naturally enough at that time but lightly esteemed.

The Garden in Columbia's Hands.

The grant of 1814 encumbered by the condition of removal, was not available for raising money by sale or mortgage, and "was not considered by the trustees an attractive or helpful gift."† They did not take formal possession until October, 1816, two years and a half after the grant, when repairs for the winter being needed, possession was tendered by the College of Physicians and Surgeons and accepted by Columbia. ‡

There was no intention of a continued maintenance of the garden; but it was thought that if the condition of removal were repealed, an advantageous sale or exchange might be effected. Urgent memorials were accordingly addressed to the legislature in 1817, 1818, and 1819 for the repeal of that condition, the last being successful, with a further gift of $10,000, as the act of 1814 "had not been productive," as the preamble recites, "of the benefit intended." § The select legislative committee that considered the application in 1819, reported that the act of 1814 was intended to give relief to Columbia equal to the $40,000 given to a sister institution [Hamilton College]; that by depreciation the grounds were not of one fourth the value supposed; that as a mere botan-

* Moore's Hist. of Columbia Col., 82. 1846.

† Hist. Columbia Un., 36. 1904.

‡ Trustees' Min. Col. Phys. and S., 2: Sept. 27, 1816; Trustees' Min. Columbia Col., 2: 477-479.

§ Laws, 1819, Ch. 19; Trustees' Min. Columbia Col., 2: 423, 477, 493.

ical garden they would be an incumbrance rather than a benefit, and that removal was impracticable. That condition was accordingly repealed, and also the seventh section as respects duplicates.*

The trustees' memorial of 1818 states, that when they took possession of the garden "the whole establishment was in a state of dilapidation and decay." † They made some repairs, and in March, 1817, let the grounds to a Mr. Gentle for one year, apparently without rent, but upon condition that he keep the green houses and grounds in order. Renewals were continued for several years, a long lease being refused on account of "the prospects of an advantageous exchange, if the property were keep unencumbered." ‡

In the summer of 1819, Dr. Hosack in behalf of the Agricultural Society applied for a lease for a term of years, free from rent, for "market gardening"; but the trustees declined to rent for a term of years, "unless a source of revenue." §

In May, 1819, the Committee on the Botanic Garden reported, that

> "Agreeably to the wish of the Trustees, the *green-house plants* belonging to the College were offered to and accepted by the Governors of the Hospital; and the Committee have given an order for the delivery of them and such *ornamental trees* and shrubs as might be removed without injury to the place." ‖

In 1823 the grounds were rented to J. B. Driver for five years at $125 per year and taxes, the tenant agreeing "to keep the grounds and buildings in order, and not to lop, cut or remove any trees or shrubbery, or pasture other than his own cattle"; and the college reserved the right to cancel the

---

* Assembly Journal, 1819: 123, 124; Trustees' Min. Columbia Col., 2: 477, 494.

† Ibid., 2: 477–479.

‡ Ibid., 2: 441, 507.

§ Ibid., 2: 515, 519.

‖ Ibid., 2: 507. It was under this order, probably, that the yew trees which now flank the stone steps leading up to the Library Building, were first removed from the Elgin Garden to the "South Court," in Bloomingdale, from which, seventy-five years later, they were transplanted to near where they now stand.

lease in case of sale; also the right to remove trees and shrubbery, and *glass* and *frames* from the front building; and the tenant was to preserve them till removed." *

In September, 1825, Dr. Hosack again applied for a lease, but the terms were not agreed on, † and in April, 1826, the garden was let to David Barnett, a seedsman, for ten years, at $500 per annum, and taxes. Barnett paid no rent; but $118 was collected by a sale of his goods in 1827, and the lease was surrendered. ‡

In the summer of 1828 Dr. Hosack, in behalf of the Horticultural society of which he was then president, applied for a lease of the grounds, again without success. In his inaugural address soon after, he commented with some severity on his failure, saying that

"It was stated to the trustees that the society's practical men would *restore* the establishment to the condition in which it was conveyed to the state." §

But the trustees preferred a rental rather than a botanical garden, and private responsibility to that of an association.

In October, 1828, two leases were executed to William Shaw for 21 years from the following May; one of 36 city lots on the block between 50th Street and 51st Street, and the other of the residue of the grounds, at the annual rent of $400, repairs and taxes on the whole, and also any assessments on the 36 lots.‖ Shaw occupied and cultivated the grounds.¶ In 1833 the trustees remitted $100 per year from the rental for three years, upon Mr. Shaw's petition showing that the premises when he took them were much more dilapidated than he supposed; that he had expended for repairs to *dwelling-house*, grounds and wall, over $5,000; that much of the ground was not tillable, being rocky beneath a thin

* Trustees' Min. Columbia Col., 3 : 84.
† Min. Stand. Com., Sept. 22, 1825.
‡ Trustees' Min., 3 : 173, 187, 248; Min. Stand. Com., Oct. 26, 1827.
§ Address Hort. Soc., Aug. 26, 1828, p. 9.
‖ Treas. Rept. Columbia Col., 1850; Trustees' Min., 4 : 336; 3 : 248.
¶ Ibid., 3 : 443, 450; Min. Stand. Com., Aug. 28.

soil, two acres swampy, and that he had received notice that the wall encroached twelve feet on Fifth Avenue.*

In November, 1833, Shaw assigned his lease to John Ward, a prominent exchange broker and banker in Wall Street and for several years president of the Stock Exchange, who had made advances to him upon it, and who held the lease until it expired in 1850. In 1835 and 1836 various negotiations were had between the trustees, who were anxious to pay off their accumulating debt, and Mr. Ward, looking to a cancellation of the lease, and the sale of new leases of single lots for long renewable terms, at a nominal rent, and a division between them of the premiums realized on the sales. The trustees voted to agree to this, provided $6,000 were first reserved to them from the proceeds, and their share of the residue to be not less than $40,000. Mr. Ward wanted 26 lots (four of them on Fifth Avenue), to be first reserved for himself. Other modifications were proposed, but no agreement could be reached.†

In 1838 the city began opening streets in the region of the garden. During the next 25 years the trustees expended over $150,000 in payment of assessments, and by their own contracts, for completing the streets and levelling the grounds, so as to be ready for use.‡ In 1850, though their debt amounted to $68,000, the trustees, disagreeing with the standing committee, voted not to sell any of the property at present.§ In 1851, the long lease having expired, the grounds were laid out into city lots, and in 1852 it was resolved to prepare them for leasing in separate lots.|| In 1856 it was voted to remove the college to the two blocks on 49th Street, and Mr. Upjohn prepared plans for one of the buildings with a facade of 280 feet.¶ But the expense made building impracticable,** and

* Trustees' Min. Columbia Col., 3 : 298, 397, 409.

† Ibid., 3 : 336, 443, 450, 454, 461, 465, 476, 477.

‡ See Treasurer's Reports, and Reports to Regents, 1851 to 1863.

§ Hist. Columbia Un., 123–124; 130–160. 1904.

|| Trustees' Min., 4 : 357, 404.

¶ Hist. Columbia Un., 129. 1904.

** Pine's Half Moon Ser., 2 : 47.

in the autumn, the asylum property on 49th Street was purchased as "temporary quarters," to which on May 12, 1857, the college removed, and remained there for 40 years.* The idea of using the garden ground for college buildings was abandoned. Its rapidly rising value proved that it was worth more for nursing the college than for housing it.

In 1857 sixteen city lots at 48th Street and Fifth Avenue were sold to the Dutch Reformed Church for $80,000, the first sale of any part of the garden grounds. In 1859, a map of the rest was made in city lots (No. 611, Reg. Office), and not long afterwards the trustees began leasing on renewable 21-year leases for the erection of first class dwellings; and before 1875 the lots on the four blocks were all taken and dwellings erected. Then, for the first time, the college came into the receipt of "highly profitable rentals," and in a few years it passed from straightened circumstances to comparative affluence.†

By the close of the century, the property that was estimated by the college authorities to be worth only from six to eight thousand dollars when received from the state, ‡ was worth as many millions. It had enabled the ill-supported college, struggling with innumerable difficulties for near a century and a half, to expand into a great university. The sale of the block between 47th and 48th Streets for about $3,000,000 within a few years past has supplied the means for the payment of a considerable part of the cost of this expansion. The residue of the grounds, if sold at present prices, would discharge the remaining indebtedness and leave a surplus endowment of several millions. If these splendid results have sprung primarily from Dr. Hosack's courageous and brilliant enterprise, they are equally the fruit of the sagacious and heroic tenacity of the college trustees for three quarters of a century in holding on to the garden property, and in resisting the temptation to purchase present ease and freedom from debt at the sacrifice of a triumphant future.

The Decline of the Garden. — This was inevitable from the time when it came to the state in 1811 and the state refused to

*Hist. Columbia Un., 160. 1904. † Ibid., 191. ‡ Ibid., 102.

make appropriations for its support. No one else had sufficient interest and ability to keep up the necessary repairs and supplies. Such repairs as were made by the tenants up to the time of the lease to Shaw in 1828, were evidently unsubstantial; for, as above noted, the grounds and buildings are repeatedly spoken of as much out of repair, deteriorated, or dilapidated (ante, pp. 328, 334, 335).

After 1819, when the green-house plants were removed, though its botanical character suffered, the trustees aimed, as the leases show, to preserve the ornamental features of the garden, as an attraction to purchasers or lessees.

The earliest known engraving of the garden is the elegant one by L. Simond, published in the Medical Repository in 1810, vol. 13, p. 217.* Another by Reinagle, in the *Catalogus Elginensis* of 1811, and in the Amer. Med. and Phil. Register, vol. 2, p. 1, 1814, is perhaps less attractive, but gives a wider view of the grounds. A third, much like the first, from a little different point of view, said to be of 1825, with a copy of the Sully portrait of Dr. Hosack, is given in the Magazine of Am. Hist., 16: 218, 219, 1886. The latter, if its date is correct, indicates the continuance of ornamental culture till 1825; and though after 1819 it was no longer maintained as a botanical exhibition, the survival of many interesting trees, hardy shrubs and herbaceous plants must have long continued to make the garden an attractive resort.

The leases given by Columbia were all for agricultural and gardening purposes.† Dr. Hosack's offer in 1828 (ante, p. 335) "to restore the establishment," and "to renew and improve the green-houses," and Shaw's petition in 1833 (ante, p. 335), show that these buildings were then standing. I can learn nothing certain after that of the state of the garden, or when the buildings were removed; except that according to the tax records, but one building remained on the block in 1849 (the prior records being destroyed by fire),

* *Lithographic copy* in Valentine's Manual, 1859, p. 204, dated 1825.

† Assembly papers, "Colleges" (Albany), pp. 410, 542, 590; Petitions for aid, 1820, 1824, 1826.

which was probably the dwelling shown in the cut near 5th Avenue, and that disappeared from the records in 1856. The green-houses were probably removed some time during Shaw's lease, or at its close.

In Spafford's Gazeteer of New York for 1824 (p. 605) is the following notice of the garden — the last contemporaneous description of it I have found:

"It embraces a great variety of indigenous, naturalized and exotic *vegetables:* . . . Elgin Grove has as many visitants as the Botanic Garden, chasing pleasure or catching knowledge."

Dr. Francis in 1829, says of it, *

"Flourishing under its founder, it perished under the neglect of the public. It is not for me to speak of the disgrace that the state sustains by its failure in this enterprise."

The Grant of the Garden to Columbia not Made as Compensation for Her Land Claims in Vermont.

It has often been stated that the grant of the garden to Columbia College by the State in 1814, was made as compensation for her loss of lands in Vermont through the treaty with that State in 1790. Dr. Moore, President of the Colleg, writing in 1846, says:

"This treaty . . . surrendered a property belonging to the college, which would at this day have been of immense value, and in doing so may be regarded as giving to the college *a claim of retribution*, which all that the state has since done for it does not fully satisfy;" †

thus intimating the existence of a claim against the State, and of grants in partial satisfaction of it.

In the New International Encyclopedia, 5: 49. 1903, however, it is directly stated that the legislature granted the Hosack Botanical Garden to Columbia College

"as a *reimbursement* for lands in New Hampshire [Vermont] belonging to the college, which were ceded by the state on the settlement of the New Hampshire grants."

* Address to N. Y. Hort. Soc. (N. Y. Hist. Soc. Tracts).

† Moore's Hist. Col. Col., 51. 1846; quoted in Hist. Col. Un. 1904: 36.

In Van Amringe's History of the College (1876) the garden grounds are said to have been

"given to the college as a *partial compensation* for the large estate in Gloucester County, Vermont, which she had lost when Vermont was made a State." *

Similar statements are found elsewhere,† and are occasionally heard in current speech; and the grant has also been referred to as an *exchange*.‡

New York by the treaty of 1790 ceded to Vermont jurisdiction over her present territory; she did not cede, grant or transfer any *title* to lands; but she *declared* that, on Vermont's agreeing to pay her $30,000, all claims and titles to lands in Vermont under grants from the Colony or State of New York (other than grants confirmatory of previous grants by New Hampshire) should *cease*. Columbia College at that time held New York Colonial grants, made from 16 to 20 years before, for about 54,000 acres of wild land. Many others held similar grants. Vermont had long prior to the treaty declared all such grants to be null and void, and by her citizen settlers she had long held possession of at least most of the lands. The intent of the treaty was to extinguish all such New York claims of title (as an incident to the independence of Vermont and of her admission into the union), and such was its practical effect.

The import of the expressions above quoted is, that this action of New York inflicted great loss on the college, and that the grant to her in 1814 was made and intended as a reimbursement, compensation or retribution for that act as a wrong.

On investigation I am persuaded that this view of the subject is wholly mistaken; that the treaty was not a wrongful act on the part of the state and inflicted no substantial loss on the New York land claimants, but was rather a benefit to them; and that the grant was a voluntary bounty, like the state's ordinary grants to educational institutions.

---

*Hist. Columbia Col., 67, 56; not found in the History of 1904, nor in Chamberlain's "Universities and their Sons," 1 : 573. 1898.

† King's Handbook of New York, 272.

‡ Columbia Univ. Quart., 5 : 279. 1903.

The question requires an examination not only of the act of 1814, but also of the origin of these land claims, their condition in 1790, and the circumstances leading to the treaty.

The Act. — Nothing in the title or preamble of the act of 1814, to which we look for an explanation of its motive, indicates compensation for an injury to be its object, but quite the contrary. Its title is

"An act instituting a lottery for the promotion of literature and for other purposes."*

Its preamble reads as follows:

"Whereas well regulated seminaries of learning are of immense importance to every country, and tend especially by the diffusion of science and the preservation of morals, to defend and perpetuate the liberties of a free state: It is enacted," etc.

The first five sections of the act provided for the lottery, and for the payment from its proceeds of the sum of $200,000 to Union College; $40,000 to Hamilton; $30,000 to the College of Physicians and Surgeons of the City of New York; and $4,000 to the Ashbury Colored Church of New York. The sixth section granted to the trustees of Columbia College

"All the right, title and interest of the People of the State in and to the parcel of land known as the Botanic Garden and lately conveyed to the people, etc., by David Hosack," etc., "on condition of the removal of the College to said tract, or to lands adjacent thereto, within twelve years." †

The reason and motive of the grant, as respects Columbia, as stated in the preamble, were the same as respects the other colleges named, viz., the public interest in the maintenance of seminaries of learning. No different purpose is intimated, and there is, therefore, a very strong presumption against any other.

There were numerous persons in the same situation with Columbia, as respects losses of Vermont lands, none of whom ever received compensation except from the fund paid by

* Laws, 1814, Ch. 120.

† This condition was repealed by Ch. 19 of the Laws of 1819.

Vermont in accordance with the treaty; and it is not supposable that an intended compensation to Columbia, denied to all others, was thus secretly smuggled into the act of 1814, under a deceptive statement of a different purpose.

The prior legislation, moreover, and the history and condition of the New York land claims at the time of the treaty, and the distribution of the indemnity fund received from Vermont, render the motive of compensation by the act of 1814 improbable in the extreme.

Prior Legislation.—The act of 1790 (Ch. 18), which authorized the treaty, appointed commissioners from New York to meet commissioners from Vermont to agree upon terms of settlement, and expressly declared that,

> "Nothing herein shall be intended or construed to give such claimants [of lands] any right to any further compensation whatever from this State, other than such compensation which may be stipulated as aforesaid" [to be paid by Vermont].

This provision, expressly excluding further compensation, was not an unadvised or a hasty one. It expressed the deliberate judgment and determination of the legislature; it was in accordance with a similar provision of the act of 1789 (repealed by that of 1790), and was enacted after discussions at various times during the preceding decade concerning a controversy of forty years' standing. It was in effect a decision by the legislature that the New York land-claims, whether good or bad originally, had become incapable of enforcement through the rebellion and long continued independence of Vermont; so that those claims were really worth only what could be obtained from Vermont by negotiation and compromise, and should no longer stand in the way of the public interests in the recognition of Vermont's independence and admission into the union.

The commissioners having agreed upon the sum of $30,000 to be paid to New York, and Vermont having agreed to pay it, New York *declared*, as above stated, that all claims and titles under New York colonial or state grants, except those

which confirmed prior grants from New Hampshire, should *cease;* and she *ceded* to Vermont her claim of sovereignty and jurisdiction over that territory, and consented that Vermont might be admitted into the federal union as an independent state. In 1791 she was accordingly admitted, after seeking admission in vain for thirteen years.*

In 1795, the exclusion of any other compensation than the fund derived from Vermont, was again enacted in the act appointing commissioners "to make a just and equitable distribution" of that fund.† Claimants were required to present their claims, and it was declared

"that all who do not present their claims within one year to the Commissioners, shall be *precluded from all compensation whatever.*"

Columbia did not present her claim. Her name is not on the commissioners' "minutes" nor among the seventy-six distributees,‡ though Mr. Duane, who for nearly ten years prior to 1795 was chairman of her board of trustees, presented his claim, and his heirs were allowed his share of about five cents per acre, on 52,500 acres. At the same rate, Columbia's share, had she proved her claim, would have been from $1,500 to $2,500, according to the acreage she held.§ This was more than the land had cost her, as the official fees for the patent and the preliminary surveys were the principal

---

*Ridpath, Hist. U. S., 366, says this payment was for the purchase of New York's claim to the *jurisdiction* of the province of Vermont. But Vermont always refused to admit that the New York land grants had any validity, and hence she would pay nothing directly to those grantees ; but her Commissioners knew, what the Act of 1790 shows, that New York would receive the money for the benefit of the New York grantees alone.

† Act of April 6, 1795, 3 N. Y. Laws, Ch. 56, p. 578. 3 Green. Laws, 220.

‡ See Commiss. Rept., 1799, Doc. Hist. N. Y., 4 : 1024–1025, H. Hall, Vt., 510. See Regents' Rept. on Bounds, 1873, pp. 226–228.

§ It is uncertain how much land Columbia had. In her petitions of 1805 and 1806, "over 100,000 acres" are stated as "held by a double grant from New York and New Hampshire." No double grant to Columbia appears in the list of 49 double grants given in Doc. Hist. N. Y., 4 : 477, 478 (qto.). The records show no patents to her from New Hampshire, and but two from New York, both by Lt. Gov. Colden ; the first, on March 14, 1770, of 24,000 acres at Kingsland, now Washington (Vol. 15 of Patents, p.

items of cost,* and these had been remitted to Columbia "as a compliment to the college." †

It is hardly credible that a loss of such a character, even had it been presented as a *claim* in 1814, would have been recognized by the legislature as a legitimate demand against the state, in the face of these three prior enactments and of Columbia's failure to prove her demand before the commissioners; or that "*compensation*" for her Vermont lands could have been intended by that act to be given to her without any reference being made to those statutes, or any reason assigned for departing from them.‡ But, in fact, the petition of 1814 did *not present* any such claim, nor ask *compensation* for anything. No such language is found in the petition. It presents forcibly and at length the urgent needs of the college. It appeals, not to any duty or obligation of the legislature, but "to its *magnanimity*, for such *assistance* as to its wisdom shall seem meet," which is the ordinary prayer for public support.§ At the close of the petition two circumstances are mentioned as emphasizing the deserts of the college; first, that for 30 years "the *patronage* extended to Columbia had been very limited — not one fifth of the benefactions . . . made to a kindred institution" [Union College]; and second, the loss of her Vermont lands, as follows:

72), and the second on August 16, 1774, of 20,000 acres near Cambridge & Johnson (Vol. 16, p. 391 of Patents). A further grant on April 6, 1774, from Gov. Tryon personally, by lease and release, of 10,000 acres at Norbury, now Worcester, the income from which was required to be applied to the maintenance of Tryonian Professorships, is stated in Pine's Charters of Columbia College, pp. 72, 84. These make in all but 54,000 acres, and of these only the first and third, it is said, are now known (Hist. Columbia Un., 35-36. 1904. See post, pp. 370). All three patents were covered by the King's prohibitory order of July 24, 1767. See post, pp. 364, 378, notes.

* The regular fees were in all $90.25 per 1,000 acres, divided among six officials, of which the governor's share was $31.25 (H. Hall's Vt., 71).

† Trustees Min., 1 : 134.

‡ Had compensation been the object of the grant to Columbia, it would have been wholly foreign to all the rest of the act, and properly the subject only of an independent statute: and that purpose not being indicated in the title or preamble of the Act of 1814, it would, under our present constitution, have been unconstitutional.

§ See Petition in full, Hist. Columbia Un., 1904, pp. 100, 101.

"That Columbia College was once in possession of landed property, which, if she still retained it, would be amply sufficient for her wants, and would save your memorialists from the afflicting necessity of importuning your honorable body. That property was transferred by the state of New York, on great political considerations, to other hands. It was entirely lost to the college, and no relief, under the privations which the loss occasioned, has hitherto been extended to her."*

Had this been strictly accurate, without other facts affecting the merits of Columbia's land-claims, a strong case for compensation might have been urged, except for the three statutes above cited.

But the real situation was quite different. The New York grants of Vermont lands were disputed from the first, and in 1790 they had become wholly unavailable to the claimants and practically worthless. For twenty years the colony and state of New York had done all that was practicable for their enforcement. Vermont, by a rebellion and revolution caused alone by the New York land-grants and the endeavors to enforce them by eviction of the earlier settlers, had won her independence of New York, and maintained it for thirteen years. Since 1782 the controversy had been practically closed, and in 1790 the state was justified in making peace with Vermont without liability for the disappointed expectations of her citizens, or even their actual losses, if there were such; and this was the reason for expressly excluding any such liability of the state, by the act authorizing the treaty.† The subject is historically so interesting, and the facts illustrating it are at this day so unfamiliar to the majority of

* Some corrections, as respects accuracy, should be made in these statements: (1) The College apparently never settled the lands or obtained actual "*possession*." It was the same with Mr. Duane, Cyc. Amer. Biog., 2: 526; (2) the state did not "transfer" the lands, as it never held them; it did *declare* that claims and *titles* under the New York colonial grants should *cease;* (3) the state did "extend relief" in the offer of the $30,000 fund, for her share in which, Columbia did not apply. Why she did not apply is a matter of conjecture only. Sharing in the fund would doubtless have worked as an estoppel against any further claim in the future, and it may have been thought best to preserve the shadow of claim still left.

† Hamilton's Works (Lodge), 7: 9–22. See post, p. 366, 1 Kent 178.

readers, that I venture to state the most material of them in some detail, though greatly abridged.

Upon the accession of the Duke of York to the throne in 1685, the Province of New York, granted to him by Charles II. in 1664, became like New Hampshire a Royal Province, and its lands an appanage of the Crown.* Its charter was *merged* and no longer operative. When the controversy between them arose, the boundaries and jurisdiction of both were alterable at the King's pleasure; the Provinces, as such, had no title in the *soil*, and their Governors, in making grants of land, acted as mere agents of the Crown, with authority limited by its orders and subject to its restrictions.

In June, 1741, Benning Wentworth was appointed Governor in Chief of "Our Province of New Hampshire," with jurisdiction extending westwards "till it meets our other Governments" (*i. e.*, New York) and "with authority to grant such lands, tenements and hereditaments as now are or hereafter shall be *in our power to dispose of.*" †

Understanding the easterly boundary of New York to be a line 20 miles east from the Hudson river, the same as that dividing New York from Massachusetts and Connecticut, Gov. Wentworth in 1749 granted to intending settlers the township of Bennington, four miles easterly of that line. But, being informed by Governor George Clinton, of New York, that the east boundary of his province was, by the Duke of York's charter, the Connecticut river, and that Massachusetts had extended further westward "by intrusion, and the neglect of New York," the dispute was referred (1750 to 1754) to the King.‡ On July 20, 1764, an order was issued by the Crown "declaring the west bank of the Connecticut river *to be* the boundary between the two provinces." This order was usually referred to by the Crown Ministers as an order "*annexing*" the disputed territory to New York; because the district was previously regarded as belonging to New Hampshire.§

* Broadhead's Hist. N. Y., 2 : 424; Colonial Doc., 3 : 332, 360.

† H. Hall's Vt., 43–46, 476; Doc. Hist. N. Y., 4 : 532.

‡ N. Y. Hist. Soc. Pub., 1869 : 281–290, 496, 502; Doc. Hist., 4 : 329.

§ Doc. Hist. N. Y., 4 : 574; Colonial Doc., 4: 625–627; ibid., 7 : 224; ibid.,

Governor Wentworth had in the meantime granted 130 townships; a few before the final submission in 1754, and the rest from 1761 to 1764, after the close of the French war in 1760, and was censured by the Board of Trade for making these grants *pendente lite.** Some of them in 1763 were hawked about the streets of New York for sale, and the district came to be known as the "New Hampshire grants." This coming to the notice of Lieutenant-Governor Colden, who was then acting Governor, he took up the matter with his accustomed vigor, wrote repeatedly in 1763 and 1764 to the Lords of Trade, who had the matter in charge, urging a speedy decision, and the impolicy of extending the power and influence of the New England governments, "all formed on Republican principles in opposition to those of the British Constitution," and of diminishing New York, formed after the English model. The Ministry was already urging taxation of the colonies. The Stamp Act soon followed. Governor Colden was informed that the reasons he suggested "for *making the Connecticut river* the boundary, were adopted"; *i. e.*, as a *new* boundary.†

The order of 1764 was thus clearlyintended and understood by the Crown to relate to the future only. It cut off Gov. Wentworth's power to make further grants, but did not deny his previous authority, nor avoid his prior grants. Explained as *annexing* the district to New York, it affirmed and validated both. Lt. Gov. Colden and the New York officials, on the contrary, assumed that Gov. Wentworth's grants were invalidated, and that the former grantees might be required to take out new surveys and new patents from New York, paying again for fees and quit rents upon the New York scale (more than double those of New Hampshire) or be disregarded and their lands patented to others. Lt. Gov. Colden accordingly, at once began issuing patents for townships in the "New

8: 12, 193, 285, 295, 318; H. Hall's Vt., 31, 52, 99, 479: Thompson's Vt., Part II., 19–20; Slade's State Papers, XV.–XX.; post, pp. 356–358, note.

*N. H. State Papers, 10: 204; Slade, 13; Colonial Doc., 8: 331.

†N. Y. Hist. Soc. Pub. 1876, 236, 285, 304, 316; Colonial Doc., 7: 562, 642; ibid., 4: 625; Jones, Hist. N. Y., 1: 48, 543; Bancroft, 5: 150, 225–247.

Hampshire grants"; and an active speculation in those lands soon arose, in which some of the most eminent citizens of New York City took part. Numerous patents were issued by Lt. Gov. Colden and Gov. Moore from 1665 to 1667, most of which conflicted with prior grants from Gov. Wentworth, under which settlements and improvements to some extent had been already made. Upon complaint being made to the King, a further order in council, made July 24, 1767,* according to the repeated directions of his Ministers, forbade any further grants in that district "until his Majesty's further pleasure should be made known"; thus *suspending the power* to make grants within that territory.†

This order was never modified. It was carefully observed by Gov. Moore, who refused to make any further grants, though urged to do so (Doc. Hist. N. Y., qto., 4: 377); and he accordingly forebore to issue the first patent to Columbia, which had been resolved on by himself and his council in 1767, shortly before he received warning of the forthcoming prohibitory order.‡ Upon his death, however, in September, 1769, Lt. Governor Colden and the succeeding governors, no doubt under similar pressure, and allured by the prospect of large official fees, upon a different construction of the King's order, but in violation of its intention and of the repeated instructions of the crown ministers, granted from 1769 to 1774 to speculators and officials,§ mostly of New York City, over

---

*Doc. Hist. N. Y., 4: 609, 612; H. Hall's Vt., 480, 88, 89; Slade's State Pap.

† Rept. Board of Trade, Dec. 3, 1772, Colonial Doc., 8: 331, 334, 339.

‡ Trustees' Min. Columbia Col., 1: 122, 134; Letters Lord Shelburne to Gov. Moore, Ap. 11 1767, and his reply; Doc. Hist. N. Y., 4: 589, 593, 610.

§ Barstow's Hist. N. H., 209; Benton's "Vermont's Early Settlers." 1894. Goldsbrow Banyar, the Clerk of the Colonial Council, was the largest speculator, and was allowed by the Commissioners of 1797 for 144,600 acres. Mr. Duane, the champion and defender of the New York grants, was the third in amount, being allowed for 52,500 acres, Doc. Hist. N. Y., 4: 1024; H. Hall's Vt., 510; Commiss. Rept., Albany, 1799.

Colden's grants were upwards of 1,000,000 acres; and his fees were from $25,000 to $30,000, occasional abatements being made; Dunmore's and Tryon's, each over half as much. H. Hall's Vt., 100, 109, 115; Vt. Hist. Collection, 1: 158. About half of Gov. Tryon's grants were confirmatory of previous patents issued by Gov. Wentworth. See Vt. Hist. Collection, 1: 152.

1,500,000 acres (besides confirmatory and military grants) including the tracts claimed by Columbia. About 500,000 acres more, previously granted by New Hampshire patents, and in part occupied, were granted by Governors Moore and Colden prior to 1767. These and subsequent grants by New York Vermont claimed to be null and void.*

*NOTE I. THE EASTERLY BOUNDARY OF THE PROVINCE OF NEW YORK; THE NEW HAMPSHIRE GRANTS.

For more than a century prior to 1764, jurisdiction of the district west of the Connecticut River to a line *twenty miles east of the Hudson*, had been generally considered and treated as belonging to the New England Colonies, from which its settlers had come. (Macauley, Hist. N. Y., 56, 57, 1829. Colonial Doc., 6: 121, 125; 7: 224; 8: 330. Cartwright to Clarendon, N. Y. Hist. Soc. Collection, 1869: 86.) With a possible slight exception near that line in Rensselaer Manor and at Hartford, that district had never been actually settled, occupied or inhabited by New York or by the Dutch. (Gov. Tryon, Colonial Doc., 8: 381. H. Hall's Vermont, 486.)

Gov. Clinton's claim of jurisdiction eastward to the Connecticut River, was based on the Charter of Charles I. to the Duke of York, in 1664, renewed in 1674, which granted to the Duke (beside other lands) "Long Island . . . abutting upon the mainland *between the two rivers* called . . . Connecticut and Hudson's River; together also with the said river called Hudson's River and all the land from the west side of Connecticut River to the east side of Delaware Bay." (Colonial Doc., 2: 295; Broadhead Hist., 2: 651.)

This description, it was claimed, conveyed to the Duke all the land between the two rivers.

But the Lords Commissioners of Trade and Plantations, who administered Colonial affairs, reported in 1757, that this description "is so inexplicit and defective that no conclusive inference can be drawn from it as to the extent of territory intended to be granted." (Colonial Doc., 7: 223, 224; Phelps' oration, Bennington, 1891, pp. 19–23; N. H. State Papers, 10: 259–261; Williams Hist. Vt., 2: 15.)

The last clause does not convey any definite tract of country; nor is it of itself a *boundary*, since it encloses nothing. It seems purposely to omit granting the lands *between* "the two rivers," which would naturally have been expressed, if intended.

There was abundant reason for the omission. For the Crown had already granted to the Massachusetts and Connecticut colonies in 1628 and 1662, that whole district from the Atlantic to the Pacific, extending north three miles beyond "any and every part of Merrimack river"; that is, nearly to the latitude of Whitehall. (See location of the "Endicott" stone, at Weirs' in 1652; N. H. Hist. Soc. Collections, 4: 194–200. 1834; Mass. Hist. Soc. Proc., 18: 400; Amer. Antiq. Soc., 7: 15.) The Massachusetts charter EXCEPTED "such lands as [on Nov. 3, 1620] were *actually possessed or inhabited* by any Christian Prince or State." (Hazard St. Pap., 1: 239, 604; Hutchinson

Though the Order of 1764 annexing the disputed district to New York was unwelcome to the settlers, no trouble would have arisen had they been left unmolested in the possession of their titles and of the improvements made

---

1: 1, 160; N. Y. Hist. Soc. Pub., 1869: 345, 361.) These "actual possessions" of the Dutch were all that the Crown after their capture had lawful power to convey.

The charter was, however, a part of the project to surprise and capture these Dutch possessions, and to "*replace*" New Netherland by *New York*, under the proprietary government of the Duke. (Denton's "Brief Description, etc.," in Gowan's Bib. Am. 1670; J. Miller's "New York," 1675; Brodhead's Hist., 2: 16, 38; Atty. Gen. in Doc. Hist., 4: 338 qto.) He was to hold what he should capture from the Dutch; but as the precise bounds of their "actual possessions" were not known, they were not defined in the charter, but were naturally left to be determined by the Royal boundary Commission sent out for that purpose with the expedition.

On Stuyvesant's surrender, September, 1664, the "actual possessions" of the Dutch being all that the Duke of York could acquire by his capture, as against the charters of Massachusetts and Connecticut, the easterly boundary of those "actual possessions" was the easterly limit of the Duke's province of New York. Regents' Bound. Rept. 1886, Sen. Doc., 71: 405.

The easterly line of the Dutch in 1664. When James I. on Nov. 3, 1620, granted to the Council of Plymouth all the lands "from Sea to Sea" between the 40th and the 48th parallel, except those "actually possessed or inhabited by some Christian Prince or State," no Dutch *Colony* had yet been planted in that region. There were only a few Dutch traders at Manhattan and Albany and along the banks of the Hudson, in the employ of the New Netherland Company. That company had a charter from the States General, granted in October, 1614, giving it a monopoly of trade with New Netherland for four years. (Jaques in Doc. Hist. N. Y., 4: 15-17; Brodhead's Hist., 1: 59-66, 134-8, 150; Trumball's Conn., 1: 546.)

The first attempt at colonization by the Dutch was through the West India Company, which in June, 1621, some months after the above grant by James I., and after the Pilgrim Settlement at Plymouth, obtained from the States General a Patent covering the two continents from the Straits of Magellan to Newfoundland. In May, 1623, that company planted the first colony at Manhattan. Their subsequent settlements and trading posts extended but little beyond Albany and along the banks of the Hudson, except a few acres at Fort Good Hope (Hartford) and some villages in southeastern Connecticut, where meeting the westward emigration of the Connecticut colonists, controversies arose, which led to a treaty at Hartford in 1650 between Governor Stuyvesant and the representatives of the "*United Colonies of New England*"—a confederation formed in 1634 for mutual protection and defense. (Bancroft's Hist. U. S., 1: 420-422.)

By this treaty it was agreed that "the bounds and limits between the United Colonies and the Dutch" should cross Long Island at Oyster Bay; and

under their prior grants.* But in 1769, numerous suits were brought upon the New York grants to evict the earlier settlers from their homes honestly acquired from New Hampshire, and practically to confiscate all the improvements made under

*N. H. State Papers, 26: pp. vi–viii. Williams' Hist. Vt. 2: 17, 1809.

on the mainland, should run "from *the west side of Greenwich Bay* (about 20 miles east of the Hudson) *twenty miles northerly up into the country; and after, as agreed between the Dutch and New Haven;* provided that said line *come not within 10 miles of Hudson's River*," and reserving also to the Dutch certain habitations at Hartford; the Dutch "not to build any house within six miles of said line," and the treaty to "be kept inviolate by both parties until a full determination be agreed on in Europe by England and Holland." (Brodhead's Hist., 1: 519, 621, 654); Hazard's State Papers 2: 169.

The line thus agreed on, though not complete or exact, limited the Dutch to from ten to twenty miles east of the Hudson in the most important part of the territory; and the provisions for an indefinite extension of this line northwards, "was a virtual abandonment of any claim to lands west of the Connecticut river" beyond 20 miles at most east of the Hudson, and along the whole New England line extending northwards to the limit of the Massachusetts colony at about the south end of Lake Champlain. This agreement was ratified by the States General in 1656, and in the Act of ratification it is described as "the line of division *between New Netherland and New England*." So in the Commission to Colve, the Dutch Governor, appointed upon the recapture of the province in 1673, this treaty is again referred to as fixing the boundary upon *New England*. (Colonial Doc., 1: 609, 611; 2: 228, 609. Brodhead's Hist., 1: 519, 621. Bancroft's Hist. U. S., 2: 295–297 (map). Smith's Hist. N. Y., 1: 20, 26, 35–38. H. Hall's Vt., 14–28, 483, 484. Hazard's State Pap., 2: 549; O'Callahan's N. Y. 2: 277. Regent's Rept. on Bounds., 1857; pp. 38, 39.)

England did not ratify the treaty because the Crown was unwilling thereby to admit that the Dutch in New Netherland had any right at all. They were regarded as intruders. But the States General never withdrew its ratification; the treaty of 1650 remained in force by its own terms, and its effect as an *acknowledgment* of the eastern limit of the "actual possessions" of the Dutch was unaffected. The exception in the Massachusetts Charter of 1628 was in fact of much less extent than was allowed by this treaty; for that exception referred to the conditions existing on November 3, 1620, when the "*actual* possessions" of the few Dutch traders along the Hudson were far short of the treaty line. (1 Hutchinson, 160.) From every point of view, therefore, the legal right and title of Massachusetts in 1664 under her charter extended at least to the 20-mile line east of the Hudson, as the extreme limit of the "actual possessions" of the Dutch, which was consequently the extreme eastern limit also of the lawful jurisdiction of the province of New York.

them except, such allowances therefor as the later New York grantees might choose to make. On the trials at Albany in 1770, the earlier grants were rejected as evidence, both on technical grounds and on the ground of Gov. Wentworth's

---

The charter to the Duke of York in 1774 was in the identical words of that of 1664, of which it was merely a reissue, designed to cure any defects in the Duke's title arising from the Crown's want of possession when the first charter was granted, or from the Dutch recapture of New Netherland in 1673. It undid nothing done under the former charter. 1 N. Y. Colonial Laws, 104.

The 20-mile line adopted by New York. The expedition for the capture of New Netherland was accompanied by a Royal commission of four persons, of which Gov. Nicolls was the head. This commission was authorized to settle disputes and to determine boundaries, which were to "continue and be observed" until otherwise determined by the crown. (Colonial Doc., 3: 51–53, 64, 110, 117, 171, 241; 7: 597. H. Hall's Vt., 31.) Their determinations were never changed, except to correct errors of detail.

In December, 1664, this commission with Gov. Nicolls, adopting the extreme easterly limit of the Hartford treaty of 1650, agreed with Connecticut upon a uniform parallel line 20 miles east of the Hudson, as the line of division. Broadhead's Hist. 2: 54. As reduced to writing, the treaty was erroneous in location and direction. (Colonial Doc., 3: 51–64, 112, 125; H. Hall's Vt., 24–28.) These errors were corrected by the commission appointed by Gov. Dongan in 1683, so as "to answer to the *true intention of the first agreement.*" (Colonial Doc., 4: 623–630; Smith's Hist. N. Y., 1: 38, 285–288.) The corrected line ran 20 miles distant from the Hudson northwards and parallel thereto, "as far as the Connecticut colony doth extend, that is, *to the southerly line of the Massachusetts colony*;" thus recognizing also, as did Nicolls' agreement, the equal westerly extent of Massachusetts. (Colonial Doc., 4: 623–630.) This report was confirmed by Gov. Dongan and his Council in 1684; by the Crown (after Massachusetts' new charter) in 1700 (Colonial Doc., 7: 776); again ratified by the N. Y. Legislature, by its Act of June 25, 1719, wherein all the boundaries are recited (1 Colonial Laws, 1039–1043); again confirmed by the Crown in 1723 (Colonial Doc., 5: 698), and the work finally completed in 1731. As respects Connecticut, this line has never since been questioned. N. Y. Hist. Soc. Pub., 1868, p. 223.

The same line applicable to Massachusetts. In his letter to the Duke of York in November, 1665, Gov. Nicolls wrote that the agreement with Connecticut "was made by *virtue of her precedent patent*"; that is, on account of her superior rights under her prior charter and the Hartford treaty of 1650, of which that agreement was in fact a recognition; that it was "*a leading case of equal justice* and of great good consequence in *all the colonies*, . . . *so that to the east of New York and Hudson's River nothing considerable now remains* to your royal highness except Long Island and *twenty miles from any part of Hudson River.*" (Colonial Doc., 3: 51, 64, 106, 110–117, 170, 235; N. Y. Hist. Soc. Pub., 1869: 76, 86.)

From these expressions it is plain that Gov. Nicolls considered that the

alleged lack of authority to make them, and judgments of ejectment were accordingly entered.*

The rulings of the Court in these cases were probably technically correct upon the evidence presented. The proper evi-

* See Small *vs.* Carpenter, etc., Benton's "Vermont's Early Settlers," p. 60; *Narrative of Proceedings*, etc., N. Y. Assembly Journal Supplement, 1773: 8.

determination of the western bounds of Connecticut applied equally to Massachusetts, the conditions in each case being the same. Her charter rights were the same; she was a party to the treaty of 1650; the Dutch possessions approached Massachusetts certainly no further eastward than they approached Connecticut, and Massachusetts had already settled several towns west of the Connecticut River. The Commissioners were apparently expecting to make the same agreement with Massachusetts, but the latter colony refused to treat with the Commission because unwilling on principle to admit its authority to bind them. (Bancroft's Hist. U. S., 2: 78–84; Hutchinson's Hist., 1: 229–257. See Pope's West. Mass., Berkshire Book, 1: 49–95. 1982.)

The Commission, however, in its report in 1665–6, expressly state that they "find *the just limits* of Massachusetts" to be the same 20-mile parallel east of the *Hudson*. (Colonial Doc., 3: 110–112.) That Massachusetts had the same westward extent as Connecticut, was also recognized by Gov. Nicolls and the Commission, in the agreement with Connecticut itself, by making the latter's western boundary line run northerly "*to the line of the Massachusetts Bay.*" (Colonial Doc., 3: 51–64.)

The report of the Dongan Commission by the use of similar language, and the numerous confirmations of that report both before and after the new charter of Massachusetts, as above noted, also directly recognized the equal westward extent of Massachusetts. In the Acts also of the Colonial Legislature of Nov. 1, 1683, and Oct. 1, 1691 (1 Colonial Laws, 123, 267) entitled "*An Act to divide this Province and Dependencies into shires and counties*," the same limit is recognized by implication, by omitting any reference to the Connecticut River or to any lands approaching it in the description of Albany County on the east side of the Hudson, but bounding it on the south by Dutchess County "running eastward *twenty miles* into the woods," without indicating that Albany County extended any further eastward. The title of the Act and the description of other counties show that the whole territory of the province was intended to be divided up. These numerous recognitions and confirmations of the 20-mile line by New York and by the Crown seem to be conclusive evidence of the general understanding.

The absence of an express *agreement* between Massachusetts and the Commission was immaterial; because (*a*) no such agreement was required; (*b*) the prior rights of Massachusetts rested upon her charter of 1628, and upon the narrow limits of the "actual possessions" or "inhabitancy" of the Dutch east of the Hudson; and (*c*) because the Commission in fact found and *reported* the 20-mile line to be her "just limits" in a report probably filed in the Plantation Office (Colonial Doc., 3: 110, 112; see "Represen-

dence for the defence was not at hand, nor easily procurable. But the result was none the less a fatal mistake.* For it subjected to the call of a few land speculators the whole power of the local executive for the enforcement of unjust,

* Mag. Am. History, 23 : 143-5.

tation, etc.," of the N. Y. Council, in June, 1763, N. Y. Hist. Soc. Pub., 1869 : 240), which finding the Crown never disapproved of, but *uniformly adhered to* for near a century afterward, until the order of annexation in 1764. Even the Duke did not try to change it. (Colonial Doc., 3 : 231, 236. 1776.)

The 20-mile line adopted by the new charter of Massachusetts. The first charter of Massachusetts was annulled in September, 1684. King William on October 7, 1691, granted her a new charter as a *Royal Province*, "*extending* towards the South Sea *westwards as far as our colonies of Rhode Island, Connecticut and the Narragansett Country*"; evidently meaning as far westward as those three provinces extend; adopting her long recognized westward extent as co-terminous with Connecticut. (Smith's N. Y., 1 : 285; Hutchinson's Mass., 2 : 7.)

The Duke of York having meantime, in 1685, ascended the throne as James II., his individual title was *merged* in the Crown; the charters of 1664 and 1674 were thereby extinguished, and the province of New York became a part of the Crown domain (Colonial Doc., 3 : 322, 361; Brodhead's Hist., 2 : 424; Benton's Vt.. 63, 76). In 1688 he *annexed* the whole province to New England, to form the "*Dominion of New England in America*," under Andros as Governor. (1 Colonial Laws, 216, 221; Colonial Doc., 3 : 537; Brodhead's Hist., 2 : 447, 500.) Soon after, during the English revolution, the *Dominion*, contrary to King William's intent, was disrupted by revolution and the mutual secession of its members. But the King accepted the situation and in 1689 appointed Sloughter governor of the "province of New York and the territories depending thereon," without any designated boundaries (Colonial Doc., 3 : 623); thus doubtless reconstituting the Province as it previously existed, with its Eastern limits as defined by the Nicolls Commission.

More than 70 years afterward, Lt. Gov. Colden in support of New York's claims eastward to the Connecticut River, urged that by its new charter Massachusetts was meant to extend only to Connecticut *River*. Mr. Duane argued that it was meant to extend *to* the Connecticut colony, *i. e.*, to its easterly line only. (N. Y. Hist. Soc. Pub., 1876 : 303; Ibid., 1870 : 72.) The objections to both contentions are insuperable. Both disregard the natural reading and meaning of the charter, by which the province is to *extend* as far as the *three colonies;* not to a *river*, nor to *one* colony alone; but as far as all three. The three abut upon the southerly side of Massachusetts and hence could not possibly form her westerly boundary: and the westward extent of the three, can only mean as far as the three extend westerly. Mr. Duane's contention would moreover limit the province to the meridian of

and in many cases, inhuman decrees. It stung the settlers to desperation; offended the instincts of humanity; turned the sympathies of the disinterested everywhere largely in favor of the settlers, which their subsequent violence and ir-

---

Worcester and leave two thirds of its former westward extent, including Springfield founded in 1636 and numerous towns on both sides of the river without any government at all. The actual exercise of full governmental jurisdiction over the whole territory and the settlement of towns up to the 20-mile line without question during a half century afterwards, prove the contrary intent of this charter, and the groundlessness of both contentions.

Gov. Sloughter soon after the new charter reported the "great narrowness" of his province. (Colonial Doc., 3: 628; Regents' Bound. Rept., 1873, p. 312.) Gov. Hunter in 1720, in reply to enquiries by the Board of Trade, stated that New York was bounded "east, *by a parallel 20 miles distant from* the Hudson." (Colonial Doc., 5: 555.) In 1738 Lt. Gov. Colden, then *Surveyor General*, answering special enquiries, reported its northerly boundary as running "east—from [Lake Ontario] along the bounds of Canada [not then determined] *to the Colony of Massachusetts Bay*, and thence southerly *along the boundaries of Massachusetts Bay and the Colony of Connecticut* to the [Long Island] Sound": stating also that the boundary of Massachusetts was disputed everywhere, but without mentioning in what respects or to what extent, it was disputed (Doc. Hist., 4: 177 (qto. 115). Colonial Doc., 5; 555, 600; 6: 125. H. Hall's Vt., 31–37); showing that Massachusetts was then understood to extend north to Canada, and that her western boundary was understood to be *a continuous southerly line from Canada along the western line of Connecticut to the Sound.*

The Vermont part of Massachusetts annexed to New Hampshire. In 1740, upon a controversy as to boundaries between New Hampshire and Massachusetts, it was determined by the Crown (unjustly, says Bancroft, 3 Hist. U. S., p. 382) that the northerly line of Massachusetts should cross the Merrimack River three miles north of Pawtucket Falls [Lowell] and run thence westerly (as at present) "to his Majesty's other Governments." This new boundary line was soon after run to within 20 miles of Hudson River, where it has since remained, being confirmed by agreement of the two provinces in 1773. (N. Y. Hist. Soc. Pub. (1870), pp. 121–122; do. (1869), 324.) Both colonies being then merely Royal provinces, the King could change their boundaries at his pleasure.

The Crown, thereupon, appointed Benning Wentworth Governor of New Hampshire (running north to Canada); and his commission, dated June 3, 1741, extended his jurisdiction "*westward until it meets with our other governments.*" (4 Doc. Hist. 532; H. Hall, Vt. App., 476.) The southern part of what is now Vermont was thus transferred from Massachusetts to New Hampshire. The change of jurisdiction did not affect its western boundary, which remained as before, a line 20 miles east of the Hudson northwards to Lake Champlain. Benton's Vt., 68.

The new charter of Massachusetts gave express power to grant all lands

regularities, and riots did not wholly destroy; and it committed New York to a false and difficult position, which she never retrieved until the Treaty of 1790. It moreover impressed the Vermont settlers with such an indelible sense of wrong,

embraced in the former charter, as theretofore. New York in December, 1786, ceded to Massachusetts, in compromise of her New York land claims, all preëmptive rights in a tract of land in Western New York equal to the area of Massachusetts. Regents' Bound. Rept., 1886 (Sen. Doc. 71), 402–417. N. Y. Laws, 2: 3, 293, Ap. 28, 1786. Benton's Vt., 174. Hotchin's West. N. Y., 3–8, 1848. N. Y. Laws, Acts of Nov. 12, 1784, Ap. 28, 1786, Mch. 24, 1795. Benton's Vt., 174. Phelps and Gorham's Purchase, p. 136.

Until the adjudication of 1740 it had not been supposed that the new charter had changed the northerly extent of Massachusetts. Hutchinson (Hist. Mass., vol. 2, p. 5) says the new province contained "the *whole* of the old colony *without any deduction or reserve.*" During nearly half a century after the new charter, Massachusetts had been in possession of that district, as under her first charter, from the Merrimack westward; she had granted lands on the southern border, settled towns west of the Connecticut, and had built Fort Dummer at Brattleboro in 1724 (the first settlement in Vermont), and continuously maintained that fort as a defence against the Indians.

North of the former Massachusetts line the country was sparsely inhabited by branches of the Algonquin Indians, mortal enemies of the Iroquois on the west side of Lake Champlain. The territory was claimed by the French, and dominated by their fortresses at Ticonderoga and Crown Point. In 1731 they planted a settlement on the east side of the lake at Chimney Point, in Addison, Vt. (B. H. Hall's Vt., 24), and held the forts until 1759, when they were abandoned near the close of the French and Indian War, all Canada being ceded to England by the treaty of Paris in 1763, 22 years after the date of Gov. Wentworth's commission. (See map, Bancroft's Hist. U. S., 2: 297.) Thus no part of what is now Vermont was at the date of that commission, or previously, under the "*government*" of New York. The Lords of Trade, in reviewing this whole matter in 1772, say that "*no establishments were made by New York*" [north of the present line of Massachusetts] "*competent to the exercise of any regular jurisdiction.*" (Colonial Doc., 8: 331. Doc. Hist. 4: 488.)

From the date of Gov. Wentworth's commission in 1741 until the King's order of 1764 the whole territory now constituting Vermont was therefore considered and treated by the Crown and its responsible ministers as a part of the province of New Hampshire, and never as appertaining to New York. By orders of the Crown in 1744, and again in 1749, New Hampshire was required to assume the support of Fort Dummer as "having lately fallen *within the limits of New Hampshire* (H. Hall's Vt., 48, 477); and in 1752 Mr. Murray, Solicitor General, afterwards Lord Mansfield, in reference to a tract of about 44,000 acres of land west of Connecticut River set off to Connecticut by Massachusetts, reported that "by the determination of the boundary line in 1738, that tract *is become a part of New Hampshire.*" (Doc. Hist., 4: 547–

and of distrust of the New York Courts, that none of New York's subsequent overtures of peace, of amnesty, and of confirmation of titles could prevail on them to put themselves again in her power, by submitting voluntarily to her authority or to the jurisdiction of her courts. It thus closed the doors

548.) And in 1757 the report of the Lords of Trade, acting upon the complaints of Governor Hardy, of New York, recommended that the western boundary of Massachusetts should be a line 20 miles east of the Hudson running "northerly to a point 20 miles due east from the Hudson, *on that line which divides the province of New Hampshire and the Massachusetts Bay*" (Colonial Doc., 7: 223, 224; Smith's Hist. N. Y., 2: 303–309; H. Hall's Vt., 38); showing that New Hampshire was considered and treated by the Lords of Trade and other Crown officers as extending westward, like Massachusetts, to within 20 miles of the Hudson on the westerly line as run in 1740–1741.

The same report, in view of the defective description of the bounds of the provinces in the charters, says that the partition line should be determined "upon *consideration of the actual and ancient possession of both*"; that they had therefore "had recourse to such papers in our office as might show the actual and ancient possession, . . . and as it appears in several of them, *almost as old as the said grants* that Massachusetts had in them been *understood to extend within 20 miles of Hudson's River*, and that many settlements had been made so far to the westward . . . and as *that evidence coincides with* the general principle of the agreement between New York and Connecticut," the report recommends the 20-mile line of division.

Numerous maps, from 1688 to 1770 including Mitchell's, "the most authoritative" (Smith's Hist. N. Y., 1: 226), prepared in 1755 under the direction of the Lords of Trade from documents, maps, and charts and surveys in the Plantation Office, show the limit of New York to be a short distance east of the Hudson, and New England with New Hampshire extending westward to Lake Champlain and thence southerly to Long Island Sound. (See H. Hall's Vt., 50–53 and frontispiece; Bancroft's Hist. U. S., 2: 297; same description of bounds in Douglas' N. Am., 2: 230. 1755.)

From the above it sufficiently appears that at the time of the capture of New Netherlands in 1664, the Dutch held no "actual possessions" east of a parallel line 20 miles distant from the Hudson along the whole western border of New England; that the rightful jurisdiction of New York never, until the order of 1764, extended further eastward than that line; but that the soil and jurisdiction to the east of it belonged to Massachusetts and Connecticut under their prior charters, and that to the eastward of the same line, New York had no established government at the time Gov. Wentworth was commisssioned in 1741, and that the latter's grants to the west of Connecticut River were authorized and valid.

The district of the New Hampshire grants annexed to New York. The order of July 20, 1764, making the west bank of the Connecticut TO BE the boundary between New York and New Hampshire, was received in New

of peace, and the only logical end was the subjugation or the independence of the settlers.

The sheriff's efforts during the following eight years to enforce these and similar judgments, sometimes with an

---

York in April, 1765. It was not a direct answer to the enquiries submitted to the Crown ten years before. It was clear as respects the future, but not clear as respects the past. The New York officials understood it to apply to the past, and thus to invalidate the prior grants of Gov. Wentworth. But the Crown had no such intent. For over 20 years it had treated the district as a part of New Hampshire, and authorized grants by its Governor accordingly. It could not invalidate these grants without gross injustice, but it could change the jurisdiction for the future by making the boundary (thenceforth) TO BE the Connecticut River. Ante, p. 346, note. Thus George III, by a discretionary but arbitrary order, *annexed* this district to New York, as James II, by a similar arbitrary order in 1688, had annexed the province of New York to New England. Neither order was long successful.

Had the subsequent instructions of the Crown ministers been sent with the original order, all trouble would probably have been avoided. But it was not until after trouble had arisen from the issuing of conflicting grants, that positive instructions were given to the Governors that prior settlers under Governor Wentworth's grants must "not be molested" (Lord Shelburne to Gov. Moore, Dec. 11, 1766, and Ap. 11, 1767; Colonial Doc., 7 : 917; H. Hall's Vt., 88–90), and that the order of July 20, 1764, only "*annexed*" the district in question to New York. (See letters, Lord Hillsborough to Gov. Moore, Feb. 25, 1768, Colonial Doc., 8: 12; to Lieut. Gov. Colden, Dec. 9, 1769, Colonial Doc., 8 : 193, 206; to Gov. Tryon, describing the district as "HERETOFORE CONSIDERED AS A PART OF NEW HAMPSHIRE, *but which was annexed to New York by his Majesty's* order in Council of July 20, 1764." (Colonial Doc., 8 : 285, 317, 318, 331, 332.) That order was always referred to and interpreted by the Crown officers in that sense, which necessarily imported that the disputed district was previously within the jurisdiction of New Hampshire and not within that of New York; that the prior titles under Gov. Wentworth were not affected by it, and that the settlers under them should not be molested, as expressly enjoined upon the Governors by Lords Shelburne and Dartmouth. (Doc. Hist., 4 : 476, 559; 7 : 917. H. Hall's Vt., 88, 89, 119. Colonial Doc., 8 : 339, 343, 356, 357. Macauley's Hist., 408, 414.) Thus, the Lords of Trade say that by the order of July 24, 1767, "his Majesty was pleased to declare that *no part of the land lying on the west side of Connecticut River within that district claimed by New Hampshire*, should be granted till his Majesty's further pleasure was known. (Colonial Doc., 8 : 331.)

The prohibitory order of July 24, 1767. Gov. Moore, by proclamation issued June 6, 1766, notified all the patentees under Gov. Wentworth to present their papers within three months, or that they would be rejected in favor of other applicants *for the lands.* (Doc. Hist., 4 : 587; N. Y. Hist. Soc. Pub., 1869: 291.) To obtain new grants from New York, as also

armed *posse eomitatus* of from 300 to 700 men,* met with forcible resistance, riot and bloodshed.

The settlers believed themselves protected by their earlier grants, and also by the King's prohibitory order of 1767; they

* Preamble to Vermont's first Constitution; Slade's Vt. State Papers, 241. Poor's "Constitutions," p. 1858.

required, payment of the New York scale of fees and quit rents was demanded (more than double those of New Hampshire), which many were unable to pay. (Robinson's Pet. in H. Hall's Vt., 86; N. Y. Hist. Soc. Pub., 1877: 11, 15, 198.) A previous order on May 22, 1765, forbade the Surveyor General to make return of any warrant of survey of any lands "actually possessed" under the New Hampshire grants, until further order. The numerous subsequent grants of such lands shows, however, that this order was disregarded. (H. Hall's Vt., 91.)

In 1767, Mr. Robinson's petition, signed by more than one thousand of the settlers, as was claimed, and reciting their hardships was presented to the Crown, which led to the speedy issue of the order of July 24, 1767, *forbidding* upon pain of his Majesty's highest displeasure, *any grant whatever of any part of the land described* in the [Privy Council's] report." This made all subsequent grants a "doubtful title." Col. Doc., 8: 339.

The order was intended and understood by the Crown to apply to all the disputed or "annexed" territory. Gov. Moore so construed it, and made no further grants. (Doc. Hist., 4: 377, qto.) He had previously received a caustic censure from Lord Shelburne for taking proceedings against New Hampshire settlers contrary to his instructions of December 11, 1766, that the settlers should "*not be molested on account of territorial differences.*" (H. Hall's Vt., 88; Doc. Hist. N. Y., 4: 589, 593.)

Repeated instructions to the different Governors from 1769 to 1773 renewed the same injunction against making any grants within that district; and Mr. Duane, counsel to Gov. Moore, could not have been ignorant of its extent and application. (H. Hall's Vt., 90, 99, 100.) This prohibition was incorporated in 1771 into the regulations imposed upon Gov. Tryon as the 49th article; and finally by another royal order of April 3, 1773, all power to make grants except to officers and soldiers was withdrawn. (Colonial Doc., 8: 330, 331, 339, 343, 356, 357, 372; Doc. Hist., 2: 821, 824.)

Gov. Moore, Lt. Gov. Colden and Gov. Tryon by special instructions from Lords Hillsborough and Dartmouth in their letters of February 25, 1768, December 9, 1769, and December 9, 1772, were forbidden in the strongest manner "to presume on any pretence to make any grant of *lands annexed to New York by the order of July 20, 1764.*" (Colonial Doc., 8: 10–12, 193, 285, 295, 318, 339, 357, 372.) The letter to Colden was received by him be, fore the first patent was issued to Columbia. (See his letter of Feb. 21, 1770, Colonial Doc., 8: 206, Colden Papers, N. Y. Hist. Soc., 1877: 207.) He understood it applied to the whole district. (See letter to Tryon, May 4, 1774, N. Y. Hist. Soc. Pub., 1877: 337.) The restrictive force of the order of 1767 was admitted by his Council, June 15, 1772. (B. H. Hall's Vt., 123.)

believed the New York Court to be venal and corrupt,* and they would make no terms with the "Yorkers," by which they would lose their homes or pay twice for them. Suits of ejectment were therefore multiplied. But after the first few trials in 1770, the settlers resolved to defend no longer in the court at Albany, but at their own hearthstones; they accordingly suffered judgments by default, but resisted writs of possession to the death.

The persistent efforts to enforce evictions under these judgments led to the formation of the "Green Mountain Boys," a rude military organization for their common defence. Committees of safety were also formed to direct measures for their mutual protection throughout the district. They forbade New York surveys for further New York grants; prevented by

* New Amer. Cyc., 16: 731, "Vermont," 1863. Judge Livingston, who presided at the trials at Albany, or his family, held by New York patents 35,000 acres of the Vermont lands. Land Patents, Albany, Vol. 14. (H. Hall, Vt., 121.)

Notwithstanding this order and all the additional instructions to the same effect, Lt. Governor Colden and the succeeding Governors after Gov. Moore's death in September, 1769, made the numerous grants above stated; Gov. Tryon even continuing to issue grants from the English war-vessel on which he had taken refuge on fleeing from the patriots in October, 1775, through the timely warning given by Mr. Duane's footman. These grants, being made without actual authority, were void as to all who had knowledge of that fact; and the order of 1767 was a matter of such common knowledge that it is difficult to see how any of the grantees could escape being chargeable with knowledge of it. Vermont granted the lands as unappropriated. H. Hall's Vt., 327.

Gov. Tryon was among the 60 persons whose lands were confiscated under the N.Y. Act of attainder, passed Oct. 22, 1779. (1 Green. Laws 26; T. Jones' Hist. N. Y. in Rev., 2: 510, 539.)

Mr. Duane's elaborate argument, "*State of the Evidence*," in favor of New York titles, may be found in N. Y. Hist. Soc. Pub., 1870: 1–154. Documents also in N. Y. Hist. Soc. Pub., 1869: 282–528. The Assembly's "State of the Right, etc.," prepared mainly by Mr. Duane (B. H. Hall's Vermont, 606), is entered at length in the New York General Assembly's Journal of 1773, pp. 90 to 116, and is also printed. As to these, see H. Hall's Vt., App. 482; N. Y. Hist. Mag., Jan., 1868: 22; Feb., 1868: 74; Mag. Am. Hist., 23: 142; also Journals of Congress, 3 and 4; Vt. Hist. Soc. Pub., 1 and 2, 506; 1 and 2, "Governor and Council"; "Slade's Vermont State Papers"; B. F. Hall's "Early History of Vermont"; R. C. Benton's "Vermont's Early Settlers," 1894; Thompson's History of Vermont, Pt. 2; Windsor's Narr. Crit. Hist. Amer., 3 :, 5 : 179. Regents' Rep. on N. Y. Bounds., 1873, 1886.

military force and intimidation many of the New York grantees from gaining possession; soon threw off all subjection to New York authority, her laws and officers; forced local New York magistrates to cease the exercise of their functions; and threatened with death all who should endeavor to arrest or remove persons indicted at Albany for resistance to the writs of possession. They ridiculed orders of arrest, and retorted with a burlesque counter proclamation for the arrest of prominent "Yorkers," including Mr. Duane.*

The sheriff's *posse comitatus*, largely sympathizing with the settlers, gave him but feeble support; and when it came to armed resistance, they would not engage in effective fighting. The Crown, disobedience of whose orders and instructions had led to all the trouble, declined to order military assistance; and Gen. Gage, when applied to by the New York Governor, refused to aid with the regulars.†

The outbreak of the Revolution checked open hostilities, but otherwise made little change. Though the Vermonters said that the only British oppression they had ever *felt* was that of the New York officials, whom they hated more than the British, they were nevertheless anxious to fight in the common cause of Independence, but under their own officers. They were the most effective barrier against attacks on New York by way of Canada; they captured Ticonderoga and Crown Point in 1775; and in 1777, by their victory at Bennington, they led to the success of Gen. Schuyler's campaign, resulting in the capture of Burgoyne and his army. But the pursuit of the settlers' possessions by the "Yorkers" continued as before; and after being harried for twelve years, they determined in convention in September, 1776, that in independence lay their only safety;‡ and in January, 1777, supported by from two thirds to three fourths of the people,

* H. Hall's Vt., 134, 234; Chipman's "*Seth Warner*," 20, 21.

† Dartmouth in Colonial Doc., 8: 339; N. Y. Hist. Soc. Pub., 1877, p. 364; Williams' Hist. Vt., 2: 1–25; Chipman's *Seth Warner*, p. 20.

‡ H. Hall's Vt., 273–276.

they declared Vermont to be an independent state.* In 1778 the whole machinery of the State Government was in operation, and its independence has been ever since maintained.

When the treaty of 1790 was made, Vermont had for 12 years been "as independent of New York as of Great Britain."† From 1779 to 1781, ten years before this treaty, Vermont had formally declared the New York colonial grants to be null and void.‡ Most of the lands not covered by the New Hampshire grants, Vermont had granted to other settlers. The Kingsland tract, claimed by Columbia, was granted to Major Elisha Burton and 64 others on Aug. 8, 1781; and there were some earlier settlers there under New Hampshire authority.§ The grantees of 1781 thereupon entered on and occupied the lands long after the expiration of the 3 years' time allowed to Columbia by the New York patents for settling and cultivating the lands granted her.‖ Up to 1781, the records show no officers or soldiers from that township.

* H. Hall's Vt., 229–234, 238, 239, 257, 273; N. Y. Assembly's letter of Aug. 11, 1778, to its Delegates in Congress, N. Y. Hist. Mag., May, 1873: p. 294.

See first Constitution and Preamble for recital of grievances against New York, Slade's State Papers, 241; Poor's "Constitutions," p. 1858.

In January, 1777, a committee of the N. Y. Convention reported that the claims of the settlers were "unjust and iniquitous" and their complaints "frivolous pretenses." Mr. Dawson, N. Y. Hist. Mag., July, 1871, 67, calls "the great body of the early settlers nothing more nor less than lawless ruffians" — the usual Tory description of the Revolutionary patriots. As respects *New York* law, the settlers were, of course, "lawless," because they were sturdy revolutionists against New York authority; but their defense was mainly by threats, intimidation, and personal chastisement — then a common mode of punishment; cases of great severity were rare. Mr. Dawson's treatment of this controversy seems to me to consist largely of immaterial, microscopic criticism and unsupported declamation. See N. Y. Hist. Mag., January, 1871, p. 52; Ibid., July, 1871, pp. 49, 62 note, 74.

† Jones' Hist. N. Y. in Revolution, 1: 51.

‡ H. Hall's Vt., 301–327, 409, note.

§ See Vt. Charters, 111–114; Thompson's Hist. Vt., Part III., 181; N. H. State Pap. 26: 728; Hemmingway, Vt. Hist. Gaz. 2: 1138.

‖ NOTE 2. It does not appear that Columbia obtained actual possession of, or settled, or cultivated her grounds, as the patents required. All the patents declared that the grant should be *null* and *void* "if the grantees do not within 3 years *settle* one family to every 1,000 acres, and *within 3 years* plant and effectually *cultivate* at least three acres for every 50 of such as is

During this long period New York had exhausted all available means, both civil and criminal, to enforce her authority and the claims of her colonial grantees. Sheriffs with a large posse had been often sent to enforce her judgments for possession; she had indicted the leaders of the rebellion, sought in vain to arrest them, offered large rewards for their apprehension, outlawed them and set a price on their heads.* Later, she had for years prevented the admission of Vermont into the Union and sought the intervention of Congress to compel her

susceptible of cultivaton." (Pine's Charters Columbia Col., 72.) The disorders of the times might have formed an excuse, had they not been known to exist in 1769, prior to the issue of Columbia's first patent, even to the interruption of further surveys. (Thompson's Hist. Vt., Part II., 19–20. Chipman's Life of Seth Warner, 21. N. Y. Hist. Soc. Pub., 1869: 299–302; Ibid., Colden Papers, 1877: 196.)

Upon the grant of Kingsland to Columbia on March 14, 1770, a committee was empowered to convey 500 acres to such settlers as they thought proper. (Trustees' Min. 1: 122, 134.) A year later, "there was not a family in the township" (Judge Chandler, in B. H. Hall's Vt., 178; Doc. Hist. N. Y., 4: 708, 709); and in February, 1771, the Judge, Sheriff and Clerk of the County, not being able to find the log-cabin that served for court-house and jail, they opened court *in the woods;* whereupon, as the Clerk entered it, "the Court, *if one*, adjourned." (Doc. Hist. N. Y., 4: 623, qto.) In 1772, there were apparently no settlers on the tract; for at a meeting of the Trustees on February 17, it was reported that "the former encouragement to settlers was *insufficient*"; and the Committee were authorized to "grant in fee to the *first twelve settlers who shall go and settle on said tract*" one 10 acre plot within, and 100 acres out of, the town." (Doc. Hist. N. Y., 4: 767.)

In April, 1772, Yates wrote Mr. Duane as respects his own grants that the civil power was insufficient; and that without military force "you will, I presume, *never recover possession* of your lands." (H. Hall Vt., 138.)

For the following twelve years the trustees' minutes are missing; but their next known mention of these lands is in November, 1787 (after the reconstitution of the college in the preceding April), when a Committee was appointed to report "means for *recovering* their landed property in the N. E. part of this State *called Vermont*." In March, 1788, a Committee was appointed "to *negotiate* with the persons claiming or *possessing* the lands," to *compromise* with them, or to let, sell, take possession or sue for them. (Trustees' Min., 2: 75, 90, 92, 99.) In September, 1788, the Committee reported that they had employed surveyors to run the lines of their land; and this is the last entry found concerning them. If Columbia had ever had possession, she had lost it; the lands were granted by Vermont, in 1781, to other settlers, and they retained them (ante, p. 44). Efforts to compromise, if made, were ineffectual.

* B. H. Hall's Hist. Vt., 607; H. Hall's Vt., 180, 181; Doc. His., 4: 869; Slade, 42.

submission. But Congress, after long vacillation, on August 20, 1781, adopted resolutions looking to the admission of Vermont into the Union, on terms which (after being at first refused) Vermont a few months afterwards accepted, while New York protested.* Thenceforward the land claims were the principal bone of contention; and with Congress no longer supporting her, New York continuously lost ground. For while Vermont maintained her independence of New York, and was not admitted into the Union, there was no tribunal to which New York could appeal. Civil war was the only resource. But Congress would not sanction civil war; and New York was not in a condition to resort to it, through the general financial distress and the difficulty of raising troops; nor would her people or the country have sustained it.†

The validity of most of the New York patents, issued contrary to the King's order, was at least doubtful; it was denied by Vermont; and if valid, the patents had now become incapable of enforcement.‡

---

* Slade's State Papers, 163–167; H. Hall's Vt., 296, 355, 382–388, 424, 434. N. H. State Papers, 10 : 225.

† See Washington's letter of February 11, 1783; Spark's Washington, 8 : 382; H. Hall's Vt., 424. Mag. Am. Hist., 23 : 149; Hamilton's Speech below cited, p. 48.

‡ NOTE 3. Beside the above irregularities, another systematic violation by the Colonial Governors of the royal orders was in the excessive grants to individuals, and to persons not intending to settle on the lands. The design of the Crown was to promote *settlements*, not speculation The regulations, therefore, limited grants to persons intending to settle and able to cultivate the land, and limited the amount of the grant, at first to 2,000 acres, afterwards 1,000, to each such person. But most of the land covered by the New York grants was in tracts of from 10,000 to 40,000 acres for speculators, who arranged for inserting in the patents the names of dummies to the requisite number, who, when the patent was issued, assigned their interests to the intended grantee, none of whom ever purposed settlement.

All the Governors (after Governor Moore) understood this practice, abetted it, and practiced it for their individual benefit. Lord Hillsborough severely censured it as evasive and *fraudulent*, as it clearly was. (Col. Doc., 5 : 10, 11; 8 : 286, 293, 373, 410; H. Hall. Vt., 100–104, 107) Columbia's 10,000 acres were derived from one of these fraudulent grants to Tryon, through a patent granted by him as Governor to 32 dummies, April 14, 1772, and by them deeded to him personally two days afterwards. (Albany Patents, Vol. 16, p. 213; Deeds, Vol. 19, p. 97. Gov. Wentworth's grants involved similar irregularities, though to a less extent.

Except in New York, the superior rights of the settlers under the New Hampshire grants prior to 1764, were generally sustained; viz., by the Cabinet Ministers of the Crown (Colonial Doc., 7: 917; 8: 343, 344, 356–359; Doc. Hist., **4**: 589); by the Board of Trade (Colonial Doc., 7: 224; 8: 330); by the Commissioners under the British Act of 1783 for compensation to Loyalists (see Jones' Hist. N. Y., **2**: 643–662), who in the case of John Monroe granted him compensation for his New York lands, but denied it for lands in Vermont for *lack of title*, because previously granted to others by Gov. Wentworth (Vt. Gov. and Council, **1**: 17; Benton's Vt. Settlers, 71); and finally after much vaccillation, by our own Congress (ante, p. 46).* The U. S. Supreme Court also in the cases of *Society for the Propagation of the Gospel vs. New Haven* (8 Wheaton 464) and *same vs.* Town of Paulet (4 Peters 480, 502), though this point apparently was not litigated, gave judgments for the plaintiffs, grantees of Gov. Wentworth, in actions of ejectment, in which the plaintiff recovers only on the strength of his own title.

In 1782 it was apparent that Vermont was irretrievably lost to New York, and efforts to make the grants effective ceased. Time soon softened the asperities of the former struggle; and when a few years later a need arose in Congress for another northern state and for more northern votes to preserve the balance of power (Doc. Hist. N. Y., 4: 1068) and to sustain the hopes of New York to retain the seat of government, the sentiment gained ground that the controversy with Vermont ought to be formally closed by her admission to the Union, though relinquishment of the land-claims was a necessary condition (Hamilton to Chipman, July 26, 1788; Life of N. Chipman, 75–77; Williams' Vt., **2**: 276–284).

Aside from these considerations, New York, after so long a struggle, was justified in making peace with Vermont without any liability to make compensation for land-claims lost as a consequence of revolution, even had they been of

---

* See N. Y. Hist. Mag., **23**: 357, 360; June, 1873. Col. Doc., **8**: 339.

substantial value.* For New York had never used or appropriated these lands in any way. When the treaty was made, there was not the remotest probability that Vermont would ever be regained, or the land-claims ever made effective. They had been virtually lost for years; not by any act of New York, but by Vermont's rebellion and successful revolution. The claims had, therefore, become prac-

* 1 Kent 178. Hamilton's Speech on his bill to recognize the independence of Vermont in 1787, from which I have here drawn (Hamilton's works, 7 (Lodge): 9–22; Grotius, Ch. 20, §8: Vattel, b. III, ch. XV, §232). Hamilton's bill passed the Assembly but failed in the Senate. His argnment was, however, the basis of the Acts passed in 1789 and 1790. In this speech he declared that Vermont "had in fact been severed from New York for years," with "no reasonable prospect of recovering it"; that "no rights capable of being rendered effective would be sacrificed," and "of course no obligation to make compensation will exist"; and he added: "I should regard the reunion of Vermont to this State as one of the greatest evils that could befall it; as a source of continual embarrassment and disquietude."

Mr. Harrison, counsel for the opponents of the bill, in his speech before the Assembly (see N. Y. Daily Advertiser, April 3, 1787) was assisted by Mr. Duane's brief (Doc. Hist., 4 (qto): 654), and urged, among other things, that "many settlers, if not all, are solicitous to secure a good permanent title to their possessions by *purchasing* the rights held under the State of New York," to which, he urged, the Bill would be a "most fatal blow"—like "the dagger of Brutus from those to whom they looked for protection." The main points of his address were:

(1) That it was *unconstitutional* to divide the State; (2) but if necessary, *compensation* must be made to those who suffer by it; (3) that Hamilton's bill in referring the land claimants to a *Federal Tribunal*, gave no actual compensation, because that resource would be too expensive to be of any value; (4) that compensation should be sought through commissioners from each state—the method finally adopted in the treaty of 1790, and through commissioners of high character and ability.

In February 1781, however, the New York Senate, like Massachusetts, had passed resolutions favoring the independence of Vermont; but Governor Clinton prevented their consideration in the Assembly by threats of prorogation (H. Hall Vt., 332–334.) This situation continued for eight years longer, till 1789; but without any benefit to the New York claimants, or any improvement in their situation or prospects of compromise. Their expectations had become visionary.

Mr. J. L. Heaton in Mag. Amer. Hist., 23: 145, says New York's claim to the grants was for a decade "as blank an absurdity as King George's own was soon to become." And Mr. B. H. Hall in his History says (p. 553) that in 1783 the idea of the reduction of Vermont was "foolish and chimerical."

tically worthless, because not enforceable. Private efforts to obtain something by compromise, after long opportunity for trial, had proved mostly fruitless. In declaring by the treaty that claims and titles under Colonial grants should *cease*, New York extinguished nothing that was, or could be made, of any substantial value to the claimants except by negotiation ; and by that means, through Commissioners, she did secure for them a small salvage, which could not have been obtained in any other way. The treaty was not an injury but a benefit to the claimants, secured by the method their counsel had advocated three years before.

It was upon this history and existing situation of the New York land-claims that the Legislature in 1789 and 1790 authorized the treaty, and enacted that it should give rise to *no claims of compensation against the State*, except upon the fund it received from Vermont — a provision which, upon the above review, seems abundantly justified.*

This situation was perfectly understood by the College trustees in 1814 ; for in 1805, and again in 1806, they had presented a petition to the Legislature for pecuniary aid, stating essentially the same facts as in the petition of 1814, except that their losses in Vermont were stated more prominently and more strongly. But aware of the Legislative exclusion

* Considering that Columbia's land-grants originally cost her almost nothing, the infirmities that attached to them and the absence of any prospect of benefit to be derived from them at the time of the treaty in 1790, the idea expressed by Dr. Moore, writing 56 years afterward, that by making the treaty the State gave the college "a claim of retribution which all that the State has since done for it does not fully satisfy' (ante, p. 21), seems irrational and fanciful. 1 Kent's Commentaries, 178, 179.

Between 1790 and 1814 the State had given the college, in 1792, 1796, 1797 and 1802 about $60,000 in land and money, and in 1814 and 1819, what was estimated at $40,000 more, all of which Dr. Moore would apparently credit on the State's imagined debt of "retribution" in part satisfaction of that claim. The trustees in 1814, however, thought differently; for in their memorial of that year (ante, p. 27) they say that "no relief has hitherto been extended to her" on that account; which shows that by the *contemporary understanding* none of those grants was given or received as "compensation" for losses in Vermont; and the grant of 1814 is in no way distinguishable from those prior grants in its character or motive.

of claims to compensation for such losses, they sought to distinguish the claim of the College as a *Scientific Institution* from that of ordinary claims; and, therefore, in 1805 and 1806 "they ask permission to enquire whether the circumstance of its being the good of the State in science which on this occasion yielded to its good in other things, does not put their case *out of the range of ordinary claims*, and entitle them to some *other remuneration* than has been allowed hitherto." *

But the distinction was disallowed and the petition was rejected.

The principal passages in that petition referring to the Vermont lands are as follows:

"Had war revered science; had the benefactions of individuals survived the struggle for independence, and had not the exigencies of the State since the peace required enormous sacrifices of property in Vermont, the Trustees would have been spared the pain of this address."

After referring to the injury to its buildings by fire and the pillaging of its library during the war and its loss of bonded capital by the depreciation of paper currency, it continues:

"Still, the College might have emerged with new lustre had it been able to retain the lands which it held in Vermont by a double grant from New York and New Hampshire, and which were surrendered by this State in the adjustment of her controversy with Vermont. The Trustees cannot refrain from expressing to your honorable body, that *this blow*, which deprived them of more than one hundred thousand acres of valuable land, which long before now would have commanded a market, *cut off their best hope* that the college in a short time would be venerated by the lovers of knowledge and reflect dignity upon the American name. They are aware that the *wound* was inflicted by the hand of *necessity*, but they ask permission to enquire whether the circumstance of its being the good of the State in Science," etc., etc., as above.

There were numerous other land-claimants, as before stated, in the same situation as Columbia College. The State could

---

* Assembly Papers, "Colleges" (State Library), Albany, pp. 75, 113. The "remuneration" doubtless referred to the fund of $30,000, paid by Vermont (ante, pp. 24-25).

not have granted compensation and thus acknowledged an obligation to Columbia while similar relief to others was refused, without subjecting itself to the charge of gross partiality and injustice; nor was Columbia at that period in any such special favor with the majority in the Legislature as would make any such favoritism, for her benefit alone, in the least degree probable. I have found no case in which such relief was granted for the loss of mere land-claims. In 1797 a petition was presented by Jacob Wilkins, John Rogers, William Linn in behalf of the Dutch Reformed Church, and by some twenty others, for relief on account of the State's "cession of lands in Vermont": it was referred to a committee, but failed, like Columbia's special claim in 1805 and 1806.*

The trustees in 1814, therefore, had every reason to believe that any *claim* to *compensation* would not only be refused, but would injure, rather than promote their petition for relief. The State, in its distribution of patronage to educational institutions in need of it, might grant as a necessary *bounty* what it must deny as compensation for lost lands — under a claim of right thereto. Hence nothing about any "claim" or "compensation" for the loss of lands is to be found in the petition of 1814.

The petition as a whole was manifestly framed as a strong appeal for the *ordinary bounty* of the State to aid an educational institution in great need of relief. Of the incidental circumstances calculated to draw favorable attention, the one first mentioned, that Columbia had not received "one fifth part of the *benefactions* made to a kindred institution," had no relevancy to a claim of *compensation*, but was very pertinent to the distribution of *patronage;* and the second circumstance, the loss of the Vermont land, was not mentioned as a subject of claim, or of specific compensation — for none of the neces-

* In 1786 to 1788 (Act of March 20) a grant of land eight miles square in western New York was made to Timothy Church and about 100 others, as compensation for personal injuries and losses of property while living in Vermont, through their efforts to uphold the authority of New York (Doc. Hist. N. Y., 4: 1014, 1027; qto ed., *ibid.*, 610, 615; B. H. Hall's Vt., 542, 757) — a wholly different case from that of the N. Y. land-claimants.

sary data for such an application was stated; but it was in inserted as a make-weight, showing a large additional loss of means which the college had formerly counted on—circumstances which might naturally induce the Legislature to give Columbia a liberal share of the patronage expected to be distributed through the new lottery (ante, pp. 26–27).

The treatment of the subject in the select committee of the Senate was of precisely this import. Had compensation for lands lost through the treaty of 1790 been the purpose of the grant, an investigation and report must have been made by the committee as to the value of the lands at the time of the treaty; the nature and condition of the college title at that time, and her ability ever to gain possession. No such investigation or report was made, or even suggested. But a most careful inquiry and an itemized report were made as to all the government *patronage* the college had received from its very foundation. Only about $45,000 in money were found, of which only $6,500 remained as an active source of revenue. The committee reported that they could not

"well conceive how the *public patronage* to so respectable and ancient an establishment should have been so limited, unless on the supposition that Columbia was too richly endowed to need it"—which was a mistake; that "no grants have been made, except by lottery, and a few small tracts of land, and 44,000 acres of land in Vermont, which was lost by the cession to Vermont," (considered as an immense sacrifice), and in closing say: "Considering her hard case, *it will comport with the dignity and magnanimity* of this State to *interpose with* the *public patronage* for her effectual relief." *

Plainly there was no thought in the minds of this committee of making reimbursement or retribution for the loss of lands in Vermont; there is no suggestion of that idea, but only of a liberal grant of public patronage for Columbia's relief.

In the various subsequent petitions also for the repeal of the "removal" condition, the grant of 1814 is nowhere referred to as compensation, but as the ordinary bounty or

* Senate Journal 1814, 37th Session, pp. 154 to 156.

assistance granted to other necessitous institutions.* By the Legislative committee of 1819 the grant of 1814 is referred to in the same manner — as bounty or assistance intended to be equal to the $40,000 given to Hamilton College, with no suggestion of compensation for Vermont lands; † and the $10,000 given by the Act of 1819 to make good the erroneous estimate of value of the Garden grounds, were given as a bounty and not as compensation for the loss of land, as further appears plainly from the preamble of that Act.‡

Such then was the conclusion of the whole matter — "to *interpose* with the *public patronage* for her effectual relief"; not to make "compensation" for the loss of land-claims excluded by law 25 years previously, again specifically barred 20 years before, and finally in 1805 and 1806, on Columbia's petition urging the claim on exceptional grounds, rejected.

The references to the meagre gifts Columbia had received, as compared with other institutions, and to the disappointment of her expectations from her landed property in Vermont, served the purpose intended. They awoke the sympathy of the Legislature, and aided in securing a land grant of the supposed value of $40,000 by the State's bounty, of which Columbia had received nothing since 1802.

But from the considerations above recited, that grant cannot rationally be ascribed to any intent of the Legislature to make compensation or "retribution" for any injury inflicted, or for any obligation to Columbia, through the treaty of 1790. That idea, so far as I can discover, is of comparatively recent origin, perhaps growing out of the later appreciation of the immense ultimate value of the grant of 1814, so far sur-

* Trustees' Min., 2 : 477, 494.

† Assembly Journal, 1819: 123, 124.

‡ It recites that, "*Whereas* it is of the first importance that seminaries of learning should be carefully *protected* and receive from time to time the *fostering aid* of the Legislature: and *Whereas, with these views*, all the right, title and interest of the people of the State . . . in the Botanic Garden were by the Act of April 4, 1814, granted to Columbia College . . . and Whereas the said grant has not been productive of the benefit intended, Therefore be it enacted" etc. — giving $10,000 and repealing the condition of the Act of 1814. This Act affected Columbia College alone. See ante, pp. 15–16.

passing the State's gifts to any other educational institution, and perhaps to all such institutions combined, as seemingly to call for explanation of such excess of favor to Columbia.

But there was never any need of explanation or apology; for Columbia has never enjoyed any excess of favor at the hands of the Legislature, certainly not in 1814. The land granted by that Act was supposed to be only equal in value to the $40,000 in money granted to Hamilton College, which was but one-fifth the amount given to Union by the same Act. The vast increase in the value of the land bestowed on Columbia was not foreseen; it was an accident of its situation; and the benefits of its increase were secured to the college, after long waiting, only by the sagacity, the untiring patience and the devoted services of the college trustees.

The Genera of the North American Gill Fungi

By F. S. Earle

In the revision of the classification of any group of organisms one of the first and most important of the problems that confronts the monographer is to decide on the number of genera to recognize and, what is often still more difficult, on the name that should properly be applied to each. Modern systematists all agree that priority should be the determining factor in the selection and application of generic and specific names. Unfortunately they are not yet fully agreed as to the exact rules of procedure by which priority is to be determined. The older naturalists did not, however, realize the need for strictly following the principle of priority. More attention was usually paid to the supposed appropriateness of a name than to the date of its first application. Each writer felt at perfect liberty to choose whatever name seemed to him most appropriate and, if no existing name pleased him, to coin a new one.

At the present time the tendency is to look upon a genus as merely a collection of closely related species and to consider that it has no standing apart from the species that compose it. Formerly a genus was considered as an independent concept or entity, and many books on genera have been written in which species are not even mentioned. When a writer changed the definition or limits of a genus he felt that he had recognized or created a new entity and that therefore he was entitled to give it a new name.

The natural growth or development of any descriptive science inevitably tends to the multiplication of genera. When only a few forms are known they are naturally thrown into a small number of generic groups. Someone then discovers a new species that does not accord with any of these and he creates a new genus for it. It may at first be monotypic or he

may associate with it certain of the older species that seem to him out of place in their former alliance. As the years go by other species are discovered and added to this genus until it becomes cumbersome, when some other student decides to divide it. He lops off groups of species here and there, giving them new generic names. It has very often happened that the original species or group of species is thus taken out of the genus and renamed while the old name remains with a group that was entirely unknown to its author. Any attempt in later years to restore this name to its original, proper application must involve a most confusing shifting of generic names. This manner of dividing genera has come to be called the "method of residues." It is responsible for a large part of the confusion which exists in the use of generic names at the present time. The process has been carried so far that in some cases all of the recognizable species have been taken away from a genus, leaving only a mass of doubtful or unknown *species inquirendae* under the old name. The case of *Sphaeria* may be cited as an example. The more advanced thinkers among the taxonomists have become convinced that the only method for preventing this most unfortunate shifting of names is to insist that a generic name shall always be retained for the species or group of species to which it was first applied, or in other words, that a generic name to be valid must always be inseparably associated with some type species. This is, in reality, only the strict recognition of the law of priority, but it is known as the "method of types." Unfortunately this principle has not been widely accepted in Europe and it was voted down at the recent International Botanical Congress held in Vienna during the summer of 1905. It is, however, recognized by the great majority of American systematists and has been incorporated in the code of botanical nomenclature formulated by the nomenclature commission appointed by the Botanical Club of the American Association for the Advancement of Science at its Washington meeting, January 2, 1903. This code was published in the Bulletin of the Torrey Botanical Club, May,

1904, and a revision, embodying a few slight changes, in the same journal for April, 1907.

This code has been followed in the selection of the generic names which are adopted in this paper. It has resulted in the rejection, owing to the errors of earlier authors, of a number of names which have become familiar to us. Still more unfortunately it necessitates the shifting of certain other names from the groups to which they have been applied in recent times to other and entirely different groups. The necessity for such changes is exceedingly regrettable, but the inconceivable confusion revealed by even a casual study of the literature of this group of plants shows that the consistent following of any possible set of rules will inevitably result in the making of many similar changes. It must be admitted that the selection of type species for the older genera, as provided in the canons of the above code, is at best often arbitrary. This is necessarily so, since the idea of the type of a genus held by its author was a mental concept and not a concrete species. It is believed, however, that the provisions of the code are so clear that in the great majority of cases the same result would necessarily be reached by any conscientious worker. Furthermore it is firmly believed that what may well be called heroic measures are necessary to bring order and stability out of a condition that can only be described by the word chaotic. The argument which is so often advanced that "existing usage" is in itself a sufficient warrant for the continued use of a name can well be met, in the case of this family at least, by the statement that there is no "existing usage." By referring to the two most recent and authoritative general works on the fungi we find that Saccardo, in the *Sylloge Fungorum*, recognizes 82 genera of gill fungi, but of these only 50 per cent. are to be found in Engler & Prantl's *Pflanzenfamilien*. Of the 54 genera found in the latter work 28 per cent. have names not used by Saccardo.

Tournefort (*Institutiones*) in 1700 included all the stalked pileate fungi, whether they had lamellae or not, in the genus

Fungus, placing the dimidiate, woody forms in *Agaricus*. Nineteen years later Dillenius (*Cat. Pl. Giss.* 1719) proposed *Amanita* for the stalked gill fungi but he still placed the sessile, dimidiate ones in *Agaricus* with the woody pore fungi. Micheli (*Nov. Pl. Gen.* 1729) adopted practically the same arrangement, but he restored the older generic name of *Fungus* for the stalked forms and dropped the name *Amanita*. Linnaeus in 1737 (*Genera Plantarum*) seems to have been the first to recognize the presence of lamellae as a character of primary importance. In all of his writings he combined all of the stalked and dimidiate lamellate fungi in a single genus, but in choosing a name for it he very unfortunately selected *Agaricus*. This name had previously only been used for sessile, usually woody and pore-bearing forms and for the very few known species of sessile gill fungi that had been associated with them. It had never included any of the central-stemmed species. According to modern ideas it is clear that he should have chosen *Amanita* or *Fungus* and not *Agaricus* as the name for the gill fungi. In fact, this was the opinion of most of his contemporaries. Battara, Haller, Adanson, and La Marck all refused to accept the innovation. As late as 1806, Roussel (*Flore du Calvados*) continued to use the name *Agaricus* exclusively for the sessile woody pore fungi. Logically and historically this is evidently its proper usage. In the first edition of the *Species Plantarum* (1753) Linnaeus recognizes 27 species of *Agaricus*, only three of which are sessile. According to a strict historical interpretation one of these, *Agaricus quercinus*, should be regarded as the type, and the name would thus be lost for any group of the gill fungi. That clause of the code, however, which provides that where economic species are included in a genus one of these must be selected as the type, enables us to designate *Agaricus campestris* as the type of the genus as taken in the Linnaean sense and thus to continue the usually accepted modern usage.

Two years after the appearance of the *Species Plantarum*, Battara (1755) published an important work, *Fungorum Agri*

Ariminensis Historia, in which he used at least twenty generic names for different groups of the gill fungi. *Agaricus* is not one of them. Neither did he follow Linnaeus in confining himself to the use of a single word for specific names, since he used binomials and polynomials indiscriminately. The genera that are accompanied by binomial specific names must certainly be considered as properly published, since they are subsequent to the arbitrarily chosen starting point of 1753, are fully described, and are for the most part fully illustrated. Many of Battara's species have been recognized and cited by Fries and other writers, but always under other generic names of their own choosing. Otto Kuntze in 1891 seems to have been the first to have recognized Battara's genera, and even he takes up but a small portion of them. A part of these names were clearly not established according to the provisions of the code, but twelve of them seem to be valid since they are accompanied by binomial species that are as certainly identifiable at the present day as are any other of the older names for which no type specimens are in existence. A certain element of doubt must always exist in regard to the identity of most of the older species of these fleshy fungi where herbarium material is so unsatisfactory and so difficult to preserve. Published plates are more or less useful, but after all we must largely rely on the traditions handed down by citation from one author to the next. It is only where these traditions can be verified by the study of living material from the type locality that anything approaching certainty can be reached.

Haller (*Historia Stirpium indigenarum Helvetiae inchoata*, 1768) seems to have been the first post-Linnaean author to take up Dillenius' generic name, *Amanita*. He uses it as the equivalent of Linnaeus' *Agaricus* to include all of the gill fungi whether central-stemmed or not. He did not follow what he evidently considered the passing fad of binomialism, but since he includes and cites all of the species of *Agaricus* in the second edition of Linnaeus' *Species Plantarum*, the genus is clearly published according to the provisions of canon 10 of the code.

As no species are figured either by Dillenius or by Haller the first rule applicable in selecting the type species is section *d* of canon 15. As the genus as here published includes *Agaricus campestris*, and as this is the only economic species, it must be selected as the type, hence the *Amanita* of Haller becomes a typonym of *Agaricus* of Linnaeus, and must be rejected. This is historically correct usage if we are to accept the *Agaricus* of Linnaeus, since the two names were used for the same group of species by so many of the older authors. They are the only two names that have ever been used to include the entire family of the gill fungi.

The next important author to publish on the genera of the gill fungi was Paulet. The text of his *Traité des Champignons* was published in 1793. In the first volume he gives a review of the early literature of the fungi with a complete table of synonyms. In the second he describes many species and a number of genera, but unfortunately he only uses vernacular names in the text, the formal latin ones appearing with the plates, which were issued later and at long intervals, in forty-two fascicles, the last not appearing until 1835, long after Paulet's death. His genera, therefore, can only date from the publication of the plates. As the original edition of the plates has not been accessible it has been difficult to determine accurately the date of issue of the different parts. Apparently fascicles 1–8 were issued prior to 1812 and no more until 1818 or later. Fascicles 31–42, containing 56 plates only, appeared in 1835, after a long interruption. With this understanding of the facts we are able to place three of his genera in the available list. These are *Hyponevris*, *Hypophyllum*, and *Hypodendrum*, and all of them are recognized in the following pages of the present memoir.

Schaeffer, Scopoli, Bolton, and Bulliard, who described so many new species, seem to have followed Linnaeus closely in the matter of genera.

Persoon was the first to classify the gill fungi on anything approaching modern lines. In *Observationes Mycologicae* (1796) he established *Russula*, and in *Tentamen Disposi-*

tionis Methodicae Fungorum (1797), *Coprinus* and *Lactaria*. He also takes up *Amanita*, and uses it for the first time in the modern sense as including species with an evident basal volva. His type, however, would fall among the ex-annulate species now usually included in *Amanitopsis*. In *Synopsis Methodica Fungorum* (1801) he reduces all of these except *Amanita* to sections of *Agaricus*. For his sections he also uses a number of other names which were taken up by Fries and hence have come down to us as generic names as used by Saccardo and other modern writers. In many cases, however, these modern genera do not contain what would have to be considered as Persoon's types had he given his groups generic rank.

In 1806, Roussel, in the admirable little work already cited, raised many of Persoon's sectional names to generic rank. It seems remarkable that this important work has been so completely overlooked. It is rarely cited and even seems to have escaped the keen eyes of Otto Kuntze, yet we get from it the earliest generic use of at least eight names for the gill fungi and of very many more in the other groups, including such important ones as *Albugo* and *Ustilago*. Here too, on page 59, we find Amanitoideae used as a family name for the gill fungi, the earliest family name to be applied to them.

S. F. Gray (1821) is the next important author from the generic standpoint. Eight of his names may be found in the available list. They include *Lepiota* and *Crepidotus*. The latter, however, is not used for brown-spored species as it was by Fries but the well-known *Pleurotus ostreatus* must stand as its type.

For the sixty years (1815–1874), during which Elias Fries was publishing on the gill fungi, he consistently followed Persoon in keeping the great majority of species in the single genus *Agaricus*, which he divided into numerous subgenera or, as he called them, "tribes." At one time or another, however, mostly in *Genera Hymenomycetes*, a pamphlet published in 1836, he established seventeen genera, a number of which he later reduced to subgeneric rank.

Quélet in 1872 (*Les Champignons du Jura et Vosges*)

raised most of the subgenera of Fries to generic rank. He must, therefore, be cited as the author of a large share of the generic names used in Saccardo's *Sylloge*. Twenty-four of these names are to be found in the appended available list. It is here, by the way, that *Inocybe* was first recognized as a genus, and not in Karsten's *Hattsvampar* (1879), as is stated in a recent monograph. In the *Enchridion Fungorum* (1886) Quélet again reduced many of these genera to subgenera, proposing new generic names for the groups in which he arranged them. This was utterly unjustifiable. Luckily only five of these new names find their way to the available list. The others are typonyms.

Gillet in 1876–8 (*Les Champignons de France*) followed Quélet's earlier work in treating the Friesian subgenera as of generic rank. He also raised two subgenera proposed by W. G. Smith to genera and made one new one.

Karsten in 1879 (*Hattsvampar*) was the first seriously to question the Friesian classification, which, based as it was on a comparatively few characters, had often resulted in the bringing into one group of many very dissimilar species. The breaking up of these incongruous aggregations necessitated the employment of many new generic names. Thirty of them are here classed as available. Karsten's work, like all that had gone before, was mostly based on obvious macroscopic characters, but it must be recognized as having been done very well indeed.

Patouillard in his various writings (mostly in the *Hyménomycètes d'Europe*, 1887) has proposed a number of new genera, of which eight are here included as available. This number would be considerably increased if the limits of the family were extended in conformity with his ideas. He is the first to utilize minute anatomical characters to any extent, in the separation of genera.

In 1889 two important works appeared. Schroeter in the *Kryptogamen Flora von Schlesien* gives us five new available names. Fayod in the *Histoire Naturelle des Agaricines* (Ann. Sci. Nat. Bot. VII. 9: 181-411) adds twenty-five more.

These latter are based entirely on microscopic and structural characters such as heretofore had received but scanty attention. Our knowledge of the histology and development of most of our species is as yet too limited to enable us always to recognize his generic distinctions.

Maire in his *Recherches Cytologique et Taxonomique sur les Basidiomycètes* (1902) has followed similar lines and has even added cytological characters. His work, however, furnishes us only one new generic name.

Various other authors have from time to time established one or more genera in this group, but the works mentioned above include the more important contributions to the generic nomenclature of the gill fungi.

In preparing this paper a card index has been made giving each name, so far as ascertained, that has been used for either a genus or a subgenus. Each card shows, besides the name of the genus, the name of the author, the date and place of publication, and the type species as determined by the above mentioned code. A parallel series of cards has also been prepared in which the name of the type species stands first, followed by the name of the genus which it typifies. For convenience the names used for the type species are those given in Saccardo's *Sylloge*.

Armed with these series of cards it is easy to learn quickly the bibliographic history of any given group. The following alphabetic list is copied from these cards. It includes the names that have been applied to genera of the gill fungi since 1753. Subgeneric names are not given except as they have been subsequently raised to generic rank; in this case the name of the author of the subgenus is given in parentheses. Those names that for any reason are not considered available are indicated by prefixing numerals as follows: (1) Type species does not belong to the family. (2) Typonym, based on the same type species as a previous genus. (3) Homonym, previously used for another genus or only a variation in spelling of the name of another genus. (4) Hyponym, not associable with a determinable binomial species. Those not so

indicated are to be considered as available, and in any proposed classification of this family each genus should bear the oldest one of these names the type of which chances to fall within its proposed limits. When more than one type falls within the limits of a genus the names of all but the oldest are to be rejected as metonyms. These, however, are still available for any future division of the genus.

Alphabetical List of the Names Proposed for the Genera of the Agaricaceae with the Date of Publication and the Nomenclatorial Type Species* of Each.

Agaricus (Dill.) L. Sp. Pl. 1171. 1753.
Agaricus campestris L.

Agrocybe Fayod, Ann. Sci. Nat. Bot. VII. 9: 358. 1889.
Naucoria semiorbicularis (Bull.).

Alectorolophoides Batt. Fung. Hist. 39. 1755.
Cantharellus cibarius Fries.

2. Amanita (Dill.) Hall. Hist. Stirp. 2: 151. 1768.
Agaricus campestris L.
See *Agaricus* L. 1753.

2. Amanitopsis Roze, Bull. Soc. Bot. Fr. 23: 50. 1876.
Amanitopsis vaginata (Bull.) Roze.
See *Vaginata* S. F. Gray. 1821.

2. Androsaceus (Pers.) Pat. Hymén. Eur. 105. 1887.
Marasmius androsaceus Fries.
See *Marasmius* Fries. 1836.

Anellaria Karst. Hattsv. 517. 1879.
Anellaria separata (L.) Karst.

3. Annularia Schulz. Verh. Zool.-Bot. Ges. Wien 16: 49. 1866.

Annularius Roussel, Fl. Calvados ed. 2. 61. 1806.
Coprinus ephemeroides (Bull.) Fries.

Anthracophyllum Ces. Myc. Borneo 3. 1879.
Anthracophyllum nigrita (Lév.) Kalchb.

2. Apus (Nees) S. F. Gray, Nat. Arr. Brit. Pl. 1: 617. 1821.
Schizophyllum commune Fries.
See *Hyponevris* Paulet. 1793–1812.

* For convenience of comparison, the type species is stated in accordance with the nomenclature of Saccardo's *Sylloge*.

ARMILLARIA (Fries) Quél. Champ. Jura Vosg. 36. 1872.
Armillaria ramentacea (Bull.) Quél.

2. ARMILLARIELLA Karst. Acta Soc. Faun. Fl. Fenn. **2**: 4. 1881.
Armillaria mellea (Vahl.).
See *Polymyces* Batt. 1755.

ARRHENIA Fries, Sum. Veg. Scand. 312. 1849.
Arrhenia tennella Fries.

ASTEROPHORA Dittm. Jour. Bot. Schrad. **3**^{3}: 56. 1809.
Nyctalis asterophora Fries.

ASTROSPORINA Schroet. Krypt. Fl. Schles. **3**^{1}: 576. 1889.
Inocybe scabella (Fries).

ASTYLOSPORA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 376. 1889.
Psathyra corrugis (Fries).

BOLBITIUS Fries, Epicr. Myc. 253. 1838.
Bolbitius vitellinus Fries.

BULLA Batt. Fung. Hist. 57. 1755.
Naucoria arvalis (Fries).

CALATHINUS Quél. Ench. Fung. 46. 1886.
Pleurotus porrigenus (Pers.).

4. CALANTICA Batt. Fung. Hist. 30. 1755.

CAMAROPHYLLUS (Fries) Karst. Hattsv. 224. 1879.
Hygrophorus caprinus (Scop.) Fries.

CAMPANELLA P. Henn. Bot. Jahrb. **22**: 95. 1895.
Campanella Buttneri P. Henn.

CAMPANULARIUS Roussel, Fl. Calvados ed. 2. 64. 1806.
Panaeolus campanulatus (L.).

2. CANTARELLUS (Juss.) Pers. Neues Mag. Bot. **1**: 106. 1794.
Cantharellus cibarius Fries.
See *Alectorolophoides* Batt. 1755.

2. CANTHARELLUS Fries, Epicr. Myc. 1838.
Cantharellus cibarius Fries.
See *Alectorolophoides* Batt. 1755.

CHALYMOTA Karst. Hattsv. 518. 1879.
Panaeolus phalenarum (Fries).

2. CHAMAECRAS (Rebent.) O. Kuntze, Rev. Gen. **3**: 454. 1898.
Marasmius androsaceus Fries.
See *Marasmius* Fries. 1836.

CHAMAEMYCES Batt. Fung. Hist. 32. 1755.
Armillaria fracida Fries.

2. CHANTEREL Adans. Fam. Pl. 2: 11. 1763.
Cantharellus cibarius Fries.
See *Alectorolophoides* Batt. 1755.

3. CHITONIA (Fries) Karst. Hattsv. 482. 1879. Not *Chitonia* Moc. & Sene. 1824.
Chitonia coprinus (Fries) Karst.

CHITONIELLA P. Henn. in E. & P. Nat. Pfl. 1[1**]: 240. 1898.
Chitonia poderes (Berk. & Br.).

4. CHLOROPHYLLUM Mass. Eur. Fung. Fl. Agar. 118. 1902. Not *Chlorophyllum* Batsch. 1802.

3. CHLOROSPORA Mass. Eur. Fung. Fl. Agar. 118. 1902. Not *Chlorospora* Speg. 1891.
Schulzeria Eyrei Massee.

CLARKEINDA O. Kuntze, Rev. Gen. 2: 848. 1891.
Chitonia coprinus (Fries) Karst.

CLAUDOPUS (W. G. Smith) Gillet, Champ. Fr. 1: 426. 1878.
Claudopus variabilis (Pers.).

CLITOCYBE (Fries) Quél. Champ. Jura Vosg. 48. 1872.
Clitocybe nebularis (Batsch) Quél.

CLITOPILUS (Fries) Quél. Champ. Jura Vosg. 87. 1872.
Clitopilus Prunulus (Scop.) Quél.

3. CLYPEUS (Britz.) Fayod, Ann. Sci. Nat. Bot. VII. 9: 362. 1889. Not *Clypea* Blume. 1825.
Inocybe asterospora Quél.

COLLYBIA (Fries) Quél. Champ. Jura Vosg. 56. 1872.
Collybia radicata (Relh.) Quél.

CONOCYBE Fayod, Ann. Sci. Nat. Bot. VII. 9: 357. 1889.
Galera tenera (Bull.).

2. COPRINARIUS (Fries) Quél. Enchr. Fung. 118. 1886.
Anellaria separata (L.) Karst.
See *Anellaria* Karst. 1879.

COPRINELLUS Karst. Hattsv. 542. 1879.
Coprinus deliquescens (Bull.) Fries.

COPRINOPSIS Karst. Acta Soc. Fl. Faun. Fenn. 2: 26. 1881.
Coprinus Friesii Quél.

COPRINUS Pers. Tent. Disp. Fung. 62. 1797.
Coprinus comatus (Muell.) Fries.

3. CORNIOLA S. F. Gray, Nat. Arr. Brit. Pl. 1: 637. 1821. Not *Corniola* Adans. 1763.
Cantharellus muscigenus (Bull.) Fries.

CORTINARIUS Roussel, Fl. Calvados ed. 2. 61. 1806.
Cortinarius armillatus (Alb. & Schw.) Fries.
CORTINELLUS Roze, Bull. Soc. Bot. Fr. **23**: 50. 1876.
Tricholoma vaccinum Pers.
2. CORTINOPSIS Schroet. Krypt. Fl. Schles. 3^1: 566. 1889.
Hypholoma lacrymabundum (Bull.).
See *Lacrymaria* Pat. 1887.
CREPIDOTUS (Nees) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 616. 1821.
Pleurotus ostreatus (Jacq.).
CRINIPELLIS Pat. Jour. de Bot. **3**: 336. 1889.
Collybia stipitaria (Fries).
CYMATELLA Pat. Bull. Soc. Myc. Fr. **15**: 193. 1899.
Cymatella minima Pat. (? Agaricaceae).
CYPHELLOPUS Fayod, Ann. Sci. Nat. Bot. VII. **9**: 365. 1889.
Locellina acetabulosa (Sow.).
CYSTODERMA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 350. 1889.
Lepiota amianthina (Scop.).
DECONICA (W. G. Sm.); Sacc. Syll. Fung. **5**: 1058. 1887.
Deconica coprophila (Bull.) Sacc.
DELICATULA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 313. 1889.
Omphalia integrella (Pers.).
1. DENDROSARCUS O. Kuntze, Rev. Gen. **3**: 462. 1898.
Pleurotus carpini (Fries).
(Based on *Dendrosarcus* Paulet, the type of which is *Fistulina hepatica*, hence it cannot be used in the Agaricaceae).
DERMINIUS (Fries) Schroet., Krypt. Fl. Schles. 3^1: 578. 1889.
Crepidotus scalaris (Fries).
DERMOCYBE (Fries) Peck, Bull. N. Y. State Mus. **2**: 8. 1887.
Cortinarius simulans (Peck) Sacc.
DICTYOLUS Quél. Enchr. Fung. 139. 1886.
Cantharellus muscigenus (Bull.) Fries.
2. DOCHMIOPUS Pat. Hymén. Eur. 113. 1887.
Claudopus variabilis (Pers.).
See *Claudopus* (Smith) Gillet. 1878.
2. DRYOPHILA Quél. Enchr. Fung. 66. 1886.
Pholiota caperata (Pers.).
See *Rozites* Karst. 1879.
DRYOSOPHILA Quél. Enchr. Fung. 115. 1886.
Hypholoma cascum (Fries).

ECCILIA (Fries) Quél. Champ. Jura Vosg. 83. 1872.
Eccilia atrides (Lasch) Quél.
ENTOLOMA (Fries) Quél. Champ. Jura Vosg. 83. 1872.
Entoloma lividum (Bull.) Quél.
EOMYCENELLA Atk. Bot. Gaz. **34**: 32. 1902.
Eomycenella echnocephala Atk.
EPHEMEROCYBE Fayod, Ann. Sci. Nat. Bot. VII. **9**: 380. 1889.
Coprinus ephemerus (Bull.) Fries.
2. FLABELLARIA Pers. Champ. Comest. 105. 1818.
Schizophyllum commune Fries.
See *Hyponevris* Paulet. 1793–1812.
FLAMMOPSIS Fayod, Ann. Sci. Nat. Bot. VII. **9**: 356. 1889.
Flammula abrupta (Fries).
3. FLAMMULA (Fries) Quél. Champ. Jura Vosg. 97. 1872. Not *Flammula* DC. 1818.
Flammula gummosa (Lasch) Quél.
2. FUNGUS Adans. Fam. Pl. **2**: 12. 1763.
Agaricus campestris L.
See *Agaricus* L. 1753.
FUSIPORA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 351. 1889.
Lepiota sistrata (Fries).
3. GALERA (Fries) Quél. Champ. Jura Vosg. 103. 1872. Not *Galera* Blume. 1825.
Galera pygmaeo-affinis (Fries) Quél.
4. GALERICULUS Batt. Fung. Hist. 33. 1755.
GALERULA Karst. Hattsv. 442. 1879.
Galera pityria (Fries).
GALORRHEUS Fries, Syst. Orb. Veg. 75. 1825.
Lactarius controversus (Pers.) Fries.
4. GELONA Adans. Fam. Pl. **2**: 11. 1763.
GEOPETALUM Pat. Hymén. Eur. 127. 1887.
Pleurotus petaloides (Bull.).
GEOPHILA Quél. Enchr. Fung. 111. 1886.
Stropharia depilata (Pers.).
GLYPTOSPORA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 377. 1889.
Hypholoma velutinum (Pers.).
GODFRINIA Maire, Rech. Cyt. Tax. Basid. 116. 1902.
Hygrophorus conicus Fries.
GOMPHIDIUS Fries, Gen. Hymen. 8. 1836.
Gomphidius glutinosus (Schaeff.) Fries.

4. GOMPHOS Batt. Fung. Hist. 33. 1755.
GOMPHOS O. Kuntze, Rev. Gen. 2 : 853. 1891.
Cortinarius castaneus Fries.

1. GOMPHUS Pers. Comm. Schaeff. Consp. 1800.
Craterellus clavatus Fries.

3. GYMNOCHILUS Clements, Bot. Surv. Neb. 4 : 23. 1896. Not *Gymnochilus* Blume. 1858.
Hypholoma appendiculatum (Bull.).
GYMNOCYBE Karst. Hattsv. 412. 1879.
Flammula Weinmanni (Fries).

4. GYMNOGOMPHUS Fayod, Ann. Sci. Nat. Bot. VII. 9 : 385. 1889.
GYMNOPILUS Karst. Hattsv. 400. 1879.
Flammula liquiritiæ (Pers.).
GYMNOPUS Roussel, Fl. Calvados ed. 2. 62. 1806.
Collybia longipes (Bull.).
GYROPHILA Quél. Enchr. Fung. 9. 1886.
Armillaria bulbigera (Alb. & Schw.) Quél.
HEBELOMA (Fries) Quél. Champ. Jura Vosg. 1872.
Hebeloma mesophaeum (Pers.) Quél.
HELIOMYCES Lév. Ann. Sci. Nat. Bot. III. 2 : 177. 1844.
Heliomyces elegans Lev.
HEMICYBE Karst. Hattsv. 248. 1879.
Lentinus ursinus Fries.

2. HEXAJUGA Fayod, Ann. Sci. Nat. Bot. VII. 9 : 389. 1889.
Clitopilus orcella (Bull.).
See *Orcella* Batt. 1755.
HIATULA (Fries) Sacc. Syll. Fung. 5 : 305. 1887.
Hiatula bengonii (Fries) Sacc.
HYDROCYBE (Fries) Karst. Hattsv. 233. 1879.
Hygrophorus sciophanus Fries.
HYDROPHORUS Batt. Fung. Hist. 51. 1755.
Hygrophorus coccineus (Schaeff.) Fries.

2. HYGROCYBE Fayod. 1889.
Hygrophorus coccineus (Schaeff.) Fries.
See *Hydrophorus* Batt. 1755.
HYGROPHORUS Fries, Gen. Hymen. 8. 1836.
Hygrophorus chrysodon (Batsch) Fries.
HYLOPHILA Quél. Enchr. Fung. 98. 1886.
Hebeloma sinuosum (Bull.).
HYPHOLOMA (Fries) Quél. Champ. Jura Vosg. 112. 1872.
Hypholoma sublateritium (Schaeff.) Quél.

Hypodendrum Paulet, Ic. 75. 1835.
Pholiota squarrosa Fries.

Hyponevris Paulet, Ic. 75. 1793–1812.
Schizophyllum commune Fries.

Hypophyllum Paulet, Ic. 11. 1793–1812.
Lactarius rufus Fries.

2. Hyporhodius (Fries) Schroet. Krypt. Fl. Schles. 3^1: 613. 1889.
Eccilia atrides (Lasch) Quél.
See *Eccilia* (Fries) Quél. 1872.

4. Hystero-sphaerocephalos Batt. Fung. Hist. 1755.

Inocybe (Fries) Quél. Champ. Jura Vosg. 151. 1872.
Inocybe relicina (Fries) Quél.

Inoloma (Fries) Karst. Medd. Soc. Fl. Faun. Fenn. **18**: 70. 1891.
Cortinarius opimus Fries.

4. Kuema Adans. Fam. Pl. **2**: 11. 1763.

Laccaria Berk. & Br. Ann. Nat. Hist. (1883): 370. 1883.
Clitocybe laccata (Scop.).

Lacrymaria Pat. Hymén. Eur. 122. 1887.
Hypholoma lacrymabundum (Bull.).

Lactaria Pers. Tent. Disp. Fung. 63. 1797.
Lactarius piperatus (L.).

Lactariella Schroet. Krypt. Fl. Schles. 3^1: 544. 1889.
Lactarius fuliginosus Fries.

3. Lactarius S. F. Gray, Nat. Arr. Brit. Pl. **1**: 623. 1821.
Lactarius piperatus (L.) Fries.
See *Lactaria* Pers. 1797.

2. Lactifluus Roussel, Fl. Calvados ed. 2. 66. 1806.
Lactarius piperatus (L.) Fries.
See *Lactaria* Pers. 1797.

Lentinellus Karst. Hattsv. 246. 1879.
Lentinus umbellatus Fries.

Lentinus Fries, Syst. Orb. Veg. 77. 1825.
Lentinus tuber-regium Fries.

Lentispora Fayod, Ann. Sci. Nat. Bot. VII. **9**: 379. 1889.
Coprinus tomentosus (Bull.).

Lentodiopsis Bubak, Hedwigia **43**: 196. 1904.
Lentodiopsis albida Bubak.

Lentodium Morgan, Jour. Cinc. Soc. Nat. Hist. **18**: 36. 1895.
Lentinius tigrinus (Bull.) Fries.

LEPIOTA S. F. Gray, Nat. Arr. Brit. Pl. 1: 601. 1821.
Lepiota procera (Scop.).
LEPISTA (Fries) W. G. Smith, Clavis Ag. Jour. Bot. 8: 26. 1870.
Tricholoma nudum (Bull.).
2. LEPTOPUS Karst. Hattsv. 242. 1879.
Arrhenia tenella Fries.
See *Arrhenia* Fries. 1849.
3. LEPTOGLOSSUM Karst. Hattsv. 242. 1879. Not *Leptoglossa* DC. 1841.
Cantharellus muscigenus (Bull.) Fries.
LEPTOMYCES Mont. Syll. Crypt. 125. 1854.
Hiatula lignifragus Mont.
3. LEPTONIA (Fries) Quél. Champ. Jura Vosg. 88. 1872. Not *Leptonium* Griffiths. 1843.
Leptonia anatina (Lasch) Quél.
LEUCOMYCES Batt. Fung. Hist. 27. 1755.
Amanita cocola (Scop.).
LEUCOPRINUS Pat. Bull. Soc. Myc. Fr. 4: 26. 1888.
Hiatula flaviceps (Pat.) Sacc.
4. LEUCOSPHAEROCEPHALUS Batt. Fung. Hist. 32. 1755.
3. LIMACIUM (Fries) Schroet. Krypt. Fl. Schles. 3^1: 530. 1889. Not *Limacia* Lour. 1790.
Hygrophorus eburneus (Bull.) Fries.
4. LITHODERMYCES Batt. Fung. Hist. 62. 1755.
LOCELLINA Gillet, Champ. Fr. 1: 428. 1878.
Locellina Alexandri Gillet.
LYOPHYLLUM Karst. Acta Soc. Faun. Fl. Fenn. 2: 3. 1881.
Collybia leucophaeata Karst.
2. MARASMIOPSIS P. Henn. in E. & P. Nat. Pfl. 1^{1**}: 230. 1898.
Marasmius subannulatus Fries.
See *Phaeomarasmius* Scherffel. 1897.
MARASMIUS Fries, Gen. Hymen. 9. 1836.
Marasmius androsaceus (L.) Fries.
MASTOCEPHALUS (Batt.) O. Kuntze, Rev. Gen. 2: 859. 1891.
Lepiota cepaestipes (Sow.).
2. MASTOLEUCOMYCES (Batt.) O. Kuntze, Rev. Gen. 2: 860. 1891.
Armillaria ramentacea (Bull.).
See *Armillaria* Quél. 1872.
3. MELALEUCA Pat. Hymén. Eur. 96. 1887. Not *Melaleuca* L. 1767.

Tricholoma melaleucum (Pers.).
MELANOLEUCA Pat. Tax. Hymén. 159. 1900.
Tricholoma melaleucum (Pers.).
MELANOTUS Pat. Tax. Hymén. 175. 1900.
Crepidotus bambusinus Pat.
2. MERULIUS Haller, Hist. Stirp. 1768.
Cantharellus cibarius Fries.
See *Alectorolophoides* Batt. 1755.
METRARIA Cooke & Massee; Sacc. Syll. Fung. **9**: 82. 1891.
Metraria insignis Cooke & Massee.
MICROMPHALE (Nees) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 622. 1821.
Pleurotus fimbriatus (Bolt.).
MONOMYCES Batt. Fung. Hist. 41. 1755.
Tricholoma sculturatum (Fries).
MONTAGNEA Fries, Gen. Hymen. 7. 1836.
Montagnites Pallasii Fries.
1. MONTAGNITES Fries, Epicr. Myc. 240. 1838.
Gymnophragmium Delilei Mont. Not *Agaricaceae*.
MUCIDULA Pat. Hymén. Eur. 95. 1887.
Armillaria mucida (Schrad.).
MYCENA Roussel, Fl. Calvados ed. 2. 64. 1806.
Bolbitius conocephalus (Bull.) Fries.
MYCENULA Karst. Medd. Soc. Faun. Fl. Fenn. **16**: 89. 1889.
Mycena pura (Pers.).
4. MYOMYCES Batt. Fung. Hist. 48. 1755.
3. MYXACIUM Peck, Bull. N. Y. State Mus. **2**: 14. 1887. Not *Myxacium* Lév. 1849.
Cortinarius amarus (Peck) Sacc.
MYXOCYBE Fayod, Ann. Sci. Nat. Bot. VII. **9**: 361. 1889.
Pholiota radicosa (Bull.).
2. NÆMATOLOMA Karst. Hattsv. 495. 1879.
Hypholoma sublateritium (Schaeff.).
See *Hypholoma* Quél. 1872.
NAUCORIA (Fries) Quél. Champ. Jura Vosg. 99. 1872.
Naucoria melinoides (Bull.) Quél.
1. NEVROPHYLLUM Pat. Hymén. Eur. 129. 1887.
Craterellus clavatus (Pers.) Fries.
NOLANEA (Fries) Quél. Champ. Jura Vosg. 89. 1872.
Nolanea pascua (Pers.).

NYCTALIS Fries, Syst. Orb. Veg. 78. 1825.
Nyctalis parasitica (Bull.) Fries.

2. OCTUJUGA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 390. 1889.
Claudopus variabilis (Pers.).
See *Claudopus* (W. G. Smith) Gillet. 1878.

3. OMPHALIA (Fries) Quél. Champ. Jura Vosg. 64. 1872. Not *Omphalius* Roussel. 1806.
Omphalia cyanophyllus (Fries).

OMPHALINA Quél. Ench. Fung. 42. 1886.
Omphalia hydrogramma (Fries).

OMPHALIUS Roussel, Fl. Calvados ed. 2. 66. 1806.
Clitocybe cyathiformis (Bull.).

OMPHALOMYCES Batt. Fung. Hist. 36. 1755.
Russula galochroa Fries.

OMPHALOTUS Fayod, Ann. Sci. Nat. Bot. VII. **9**: 338. 1889.
Pleurotus olearinus (DC.).

ONCHOPUS Karst. Hattsv. 526. 1879.
Coprinus clavatus (Batt.) Fries.

ORCELLA Batt. Fung. Hist. 74. 1755.
Clitopilus orcellus (Bull.).

OUDESMANSIELLA Speg. Anal. Soc. Ci. Argent. **12**: 1881.
Oudesmansiella platensis Speg.

PANAEOLUS (Fries) Quél. Champ. Jura Vosg. 121. 1872.
Anellaria fimeputris (Bull.) Karst.

PANELLUS Karst. Hattsv. 512. 1879.
Panus stypticus (Bull.).

PANNUCIA Karst. Hattsv. 512. 1879.
Psathyra fatua (Fr.).

PANUS Fries, Epicr. Myc. 396. 1838.
Panus farneus Fries.

PAXILLUS Fries, Gen. Hymen. 8. 1836.
Paxillus involutus (Batsch.) Fries.

4. PETRONA Adans. Fam. Pl. **2**: 11. 1763.

PHAEOHYGROCYBE P. Henn. Bot. Jahrb. **30**: 50. 1901.
Phaeohygrocybe Zenkeri P. Henn.

PHAEOLIMACIUM P. Henn. Monsunia **1**: 14. 1899.
Phaeolimacium bulbosum P. Henn. & Nym.

PHAEOMARASMIUS Scherffel, Hedwigia **36**: 289. 1897.
Marasmius subannulatus (Trog.) Fries.

PHIALOCYBE Karst. Hattsv. 415. 1879.
Crepidotus epibryus (Fries).

4. PHLEBOPHORA Lév. Ann. Sci. Nat. Bot. II. **16**: 238. 1841.
(Founded on an abnormality.)

PHLEGMACIUM (Fries) Fayod, Ann. Sci. Nat. Bot. VII. **9**: 375. 1889.
Cortinarius saginus Fries.

PHOLIOTA (Fries) Quél. Champ. Jura Vosg. 91. 1872.
Pholiota dura (Bolt.) Quél.

PHOLIOTELLA Speg. Bol. Acad. Ci. Cordoba **11**: 412. 1889.
Pholiotella blatteropsis Speg.

PHOLIOTINA Fayod, Ann. Sci. Nat. Bot. VII. **9**: 359. 1889.
Pholiota blattaria (Fries).

PHYLLOPORUS Quél. Fl. Myc. 409. 1888.
Gomphidius rhodoxanthus (Schw.) Fries.

3. PHYLLOTUS Karst, Hattsv. 92. 1879. Not *Phyllota* Benth. 1837.
Pleurotus porregeus (Pers.).

PICROMYCES Batt. Fung. Hist. 47. 1755.
Hebeloma fastibile (Fries).

PILOSACE (Fries) Pat. Hymén. Eur. 122. 1887.
Pilosace algeriensis (Fries).

2. PLEUROPUS Roussel, Fl. Calvados ed. 2. 67. 1806.
Clitopilus orcellus (Bull.).
See *Orcella* Batt. 1755.

PLEUROTELLUS Fayod, Ann. Sci. Nat. Bot. VII. **9**: 359. 1889.
Pleurotus hypnophilus (Berk.).

PLEUROTUS (Fries) Quél. Champ. Jura Vosg. 77. 1872.
Pleurotus corticatus (Fries) Quél.

PLICATURA Peck, Ann. Rep. N. Y. State Mus. **24**: 75. 1872.
Trogia alni (Peck) Sacc.

PLUTEOLUS (Fries) Gillet, Champ. Fr. **1**: 549. 1876.
Pluteolus reticulatus (Pers.) Gillet.

PLUTEOPSIS Fayod, Ann. Sci. Nat. Bot. VII. **9**: 377. 1889.
Agaricus pellospermus Bull. (*Psathyra corrugis* Sacc. pro parte).

PLUTEUS Fries, Gen. Hymen. 6. 1836.
Pluteus cervinus (Schaeff.) Fries.

POCILLARIA (P. Browne) O. Kuntze, Rev. Gen. **2**: 865. 1891.
Lentinus crinitus Fries.

POLYMYCES Batt. Fung. Hist. 34. 1755.
Armillaria mellea (Vahl.).

PRATELLA (Pers.) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 626. 1821.
Agaricus arvensis Schaeff.

PRUNULUS (Cesalp.) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 630 1821.
Mycena pelianthina (Fries).

PSALLIOTA (Fries) Quél. Champ. Jura Vosg. 107. 1872.
Agaricus cretaceus Fries.

3. PSATHYRA (Fries) Quél. Champ. Jura Vosg. 122. 1872.
Psathyra conopilea (Fries) Quél. Not *Psathyra* Spreng. 1818. (= *Psathura* Commerson 1789.)

PSATHYRELLA (Fries) Quél. Champ. Jura Vosg. 122. 1872.
Psathyrella gracilis (Fries) Quél.

2. PSELLIOPHORA Karst. Hattsv. 528. 1879.
Coprinus comatus (Muell.) Fries.
See *Coprinus* Pers. 1797.

PSEUDOFARINACEUS Batt. Fung. Hist. 29. 1755.
Volvaria gloiocephala Fries.

PSILOCYBE (Fries) Quél. Champ Jura Vosg. 116. 1872.
Psiloycbe cernua (Vahl.) Quél.

4. PTEROPHYLLUS Lév. Ann. Sci. Not. Bot. III. **2**: 178. 1844. (An abnormality.)

4. PTYCHELLA Roze & Boudier, Bull. Soc. Myc. Fr. **26**: lxxiv. 1879. (An abnormality.)

RADDETES Karst. Hedwigia **26**: 112. 1887.
Stylobates turkestanicus Karst.

RESUPINATUS (Nees) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 617. 1821.
Pleurotus applicatus (Batsch).

RHACOPHYLLUS Berk & Br. Jour. Linn. Soc. **11**: 559. 1871.
Rhacophyllus lilacinus Berk. & Br.

3. RHIPIDIUM Wallr. Fl. Crypt. Germ. **2**: 742. 1833.
Panus stypticus (Bull.) Fries. Not *Rhipidium* Trinn. 1820.

2. RHODOPHYLLUS Quél. Enchr. Fung. 57. 1886.
Entoloma lividum (Pers.).
See *Entoloma* Quél. 1872.

RIMBACHIA Pat. Bull. Soc. Myc. Fr. **7**: 159. 1891.
Rimbachia paradoxa Pat.

2\. RHODOSPORUS Schroet. Krypt. Fl. Schles. 3^1: 617. 1889.
Clitopilus prunulus (Scop.).
See *Clitopilus* Quél. 1872.

RIPAR TITES Karst. Hattsv. 477. 1879.
Inocybe Tricholoma (Alb. & Schw.).

ROUMEGUERIA Karst. Hattsv. 452. 1879.
Hebeloma strophosum (Fries).

2\. ROUMEGUERITES Karst. Hattsv. 571. 1879.
(= *Roumegueria*).

ROZITES Karst. Hattsv. 290. 1879.
Pholiota caperata (Pers.).

RUSSULA Pers. Obs. Myc. 1: 100. 1796.
Russula lepida Fries.

RUSSULINA Schroet. Krypt. Fl. Schles. 3: 550. 1898.
Russula integra Fries.

2\. RUSSULIOPSIS Schroet. Krypt. Fl. Schles. 3^1: 622. 1889.
Clitocybe laccata (Scop.).
See *Laccaria* Berk. & Br. 1883.

RYSSOSPORA Fayod, Ann. Sci. Nat. Bot. VII. 9: 361. 1889.
Flammula apicrea (Fries).

2\. SCAPHOPHORUM Ehrenb. Horae Phys. Berol. 1: 94. 1820.
Schyzophyllum commune Fries.
See *Hyponevris* Paulet. 1793–1812.

SCHINZINIA Fayod, Ann. Sci. Nat. Bot. VII. 9: 365, 1889.
Schinzinia pustulosa Fayod.

2\. SCHIZONIA Pers. Myc. Eur. 3: 14. 1828.
Schyzophyllum commune Fries.
See *Hyponevris* Paulet, 1793–1812.

2\. SCHIZOPHYLLUM Fries, Syst. Myc. 1: 330. 1821.
See *Hyponevris* Paulet, 1793–1812.

2\. SCHIZOPHYLLUS Fries, Obs. Myc. 1: 103. 1815.
See *Hyponevris* Paulet, 1793–1812.

SCHULZERIA Bres. in Sacc. Syll. Fung. 5: 72. 1887.
Schulzeria rimulosa Bres. & Schulz.

SCYTINOTUS Karst. Hattsv. 97. 1879.
Panus ringens Fries.

SIMOCYBE Karst. Hattsv. 416. 1879.
Naucoria lugubris (Fries).

SPHAEROCEPHALUS Batt. Fung. Hist. 32. 1755.
Armillaria focalis (Fries).

2. SPHAEROPUS Paulet, Ic. 108. 1835.
Nyctalis asterophora Fries.
See *Asterophora* Dittm. 1809.
SPHAEROTRACHYS Fayod, Ann. Sci. Nat. Bot. VII. 9: 374. 1889.
Cortinarius liquidus Fries.
STROPHARIA (Fries) Quél. Champ. Jura Vosg. 110. 1872.
Stropharia aeruginosa (Curt.) Quél.
STYLOBATES Fries, Epicr. Myc. 370. 1838.
Stylobates paradoxus Fries (probably an abnormality).
TAPINIA (Fries) Karst. Hattsv. 452. 1879.
Paxillus pannuoides Fries.
TELAMONIA (Fries) Peck, Bull. N. Y. State Mus. 2: 8. 1887.
Cortinarius gracilis (Peck) Sacc.
3. TRICHOLOMA (Fries) Quél. Champ. Jura Vosg. 38. 1872. Not *Tricholoma* Benth. 1846.
Tricholoma colossum (Fries) Quél.
TROGIA Fries, Gen. Hymen. 10. 1836.
Trogia Montagnei Fries.
TUBARIA (W. G. Smith) Gillet, Champ. Fr. 1: 537. 1876.
Tubaria inquilina (Fries) Gillet.
UROSPORA Fayod, Ann. Sci. Nat. Bot. VII. 9: 328. 1889.
Pleurotus striatulus (Fries).
3. VAGINARIUS Roussel, Fl. Calvados ed. 2. 59. 1806. Not *Vaginaria* Rich. in Pers. Enchr. 1805.
Lepiota cepaestipes cretacea (Bull.) Sacc.
VAGINATA (Nees) S. F. Gray, Nat. Arr. Brit. Pl. 1: 601. 1821.
Amanitopsis vaginatus (Bull.).
4. VOLVA (Plin) Adans. Fam. Pl. 2: 12. 1763.
VOLVARIELLA Speg. Anal. Mus. Nac. Buenos Aires 6: 118. 1899.
Volvariella argentina Speg.
3. VOLVARIUS Roussel, Fl. Calvados ed. 2. 59. 1806. Not *Volvaria* DC. 1805 (a lichen).
Volvaria volvacius (Bull.).
XEROTINUS Reichenb. Consp. 14. 1828.
Xerotus afer Fries.
3. XEROTUS Fries, Elench. Fung. 1: 48. 1830. Not *Xerotes* R. Brown. 1810.
Xerotus afer Fries.

Systems of Classification

It is difficult to propose a satisfactory arrangement for the genera of this family. They do not present an orderly progression from lower and simpler to higher and more complex forms, but can be likened rather to an amoeba-like body with arms extending in various directions. Thus the chanterelles and their allies shade off so imperceptibly into the Thelephoraceae that authorities are not agreed as to where to draw the line between them. *Panus* is related to *Lenzites* and the other lamellate Polyporaceae. *Paxillus* has some of the characters of the Boletaceae, while *Coprinus* with its deliquescent lamellae points clearly in the direction of *Gyrophragmium* and similar forms among the Gasteromycetes. No character can be selected for the primary division of this mass into groups that will not result at some point in the artificial separation of clearly related forms. Fries, whose system of classification is the one still usually followed, after first lopping off a few outlying groups, based his primary division on the color of the spores. His other generic or, rather, subgeneric characters were based for the most part on the mode of attachment of the lamellae, whether free, adnexed, adnate, or decurrent; on the nature of the stem, whether fleshy and uniform in texture or slender and tubular with a cartilaginous cortex; and on the presence or absence of an annulus or volva. The use of these few characters often resulted in the bringing together under the same generic or subgeneric name of great numbers of rather incongruous species which it was necessary to subdivide into sections. Quélet's contribution was simply that of raising Fries's subgenera to generic rank without in the least altering the scheme of the classification. Karsten went further. He evidently intended to make each generic name stand for a homogeneous clearly related group of species. To accomplish this he recognized numerous other characters as of generic rank and named as genera many of the sectional groups of Fries. His characters were still for the most part macroscopic. Patouillard, Fayod, and Maire have used microscopic, histological and cytological

characters as well. There can be no question that the careful histological study of a large series of species, with special attention to the earliest stages and to development, would throw much light on their relationships. At present, however, our knowledge of these characters, especially as far as our American species are concerned, is too limited to admit of broad generalizations. It is my belief, also, that histological characters of importance will in nearly all cases be found to be correlated with recognizable macroscopic differences. Hennings in the *Pflanzenfamilien*, while he has recognized a considerable number of tribes or subfamilies, has not kept pace with the modern tendencies in the matter of genera, but tends to revert to the complicated system of a few large genera with many subgenera and sections. His generic names have been chosen, too, according to a system which is quite incomprehensible.

In seeking for a character to use as the primary dividing line for the grouping of the genera belonging to the great tribe Agariceae in arranging the following key, the presence or absence of a membranous organ covering the young lamellae has finally been chosen, thus grouping them in two series, Gymnophylli and Cryptophylli. This seeming innovation is in reality only a return to the original basis of classification first proposed by Persoon. It is not fully satisfactory and results in the separation of some evidently related groups. Part of such old genera as *Tricholoma*, *Hebeloma*, *Flammula*, *Coprinus* and *Lentinus* will be found in each of these series. There can be little question that the genus *Leucomyces* (usually known as *Amanita*) with its basal cup-like volva formed from the universal veil, and its well-marked annulus formed from the partial veil or cortina, represents the highest and most complex type to be found among the gill fungi. It should be noted that here the young lamellae are protected by two clearly distinct membranes, each of which has unfortunately been called a veil. In this discussion this term will be retained for the outer or universal covering, while the inner or partial one will be referred to as the cortina. Since these membranes thus mark the highest

development attained by the family it seems only logical to accept the presence or absence of one or both of them as a character of primary importance. Two practical inconveniences, however, must be admitted. First, the two membranes are often confounded in descriptive works and, as either of them may or may not form an annulus on the stem, it is often impossible to determine from the literature which organ is really present. Second, the rudiment of a veil consisting of a more or less evident powdery or waxy coating is said to exist in the very young stages of even the most pronounced gymnophyllous species, while in many that are clearly cryptophyllous the veil entirely disappears at an early stage in the growth of the pileus. However, there are probably very few cases in which a careful examination of the younger stages will not show at once to which of the two series any given species belongs. Only three tribes are here recognized, the Cantharelleae, the Lactarieae and the Agariceae, the last divided in two series as above indicated.

The characters selected for the separation of genera are for the most part the old familiar ones, although others have been utilized when necessary to carry out the fundamental idea of making each generic name stand as far as possible for a compact, clearly related assemblage of species. The system adopted may therefore be considered as an amplification of that of Karsten or at least as being based on the same fundamental idea. Further study, and the discovery of the yet unknown multitudes of species which unquestionably exist in our territory, will result in a considerable increase in the number of genera to be recognized, and it is hoped that it may also lead to a better understanding of relationships and to a more natural grouping. The arrangement adopted in the following key is largely a matter of convenience, and yet the attempt has been made, so far as is possible in a lineal arrangement, to bring related genera together.

The family as here limited is taken in a narrower sense than has been done by Patouillard and others. This, too, is also done more as a matter of convenience than as expressing any fixed views as to natural limits.

Key to the North American Genera of Agaricaceae

Key to the Tribes

1. Hymenium plicate, covering obtuse folds: spores white. Cantharelleae.
   Hymenium covering true lamellae . . . . 2.
2. Cells of the sporocarp in part swollen, vesicular: spores white or yellow . . . . Lactarieae.
   Cells of the sporocarp all slender, elongated: spores black, brown, pink or white . . . . Agariceae.

Tribe I. CANTHARELLEAE

1. Sporocarp tough, coriaceous or woody, reviving . . . . 2.
   Sporocarp fleshy or membranous, putrescent, not reviving . . . . 4.
2. Stipe lateral or wanting . . . . 1. Plicatura.
   Stipe central . . . . 3.
3. Pileus thick, firm, woody . . . . 2. Xerotinus.
   Pileus thin, membranous, tubular (see below . . . . 5. Trogia).
4. Stipe eccentric, lateral, or wanting . . . . 3. Dictyolus.
   Stipe central or nearly so . . . . 5.
5. Densely connate-cespitose: pileus irregular . . . . . 4. Merismodes.
   Scattered or gregarious: pileus regular or nearly so . . . . 6.
6. Pileus turbinate, infundibuliform or tubular . . . . 7.
   Pileus convex or depressed, fleshy . . . . 8.
7. Pileus thin, membranous . . . . 5. Trogia.
   Pileus thick, tough and somewhat corky . . . . . . 6. Turbinellus.
8. Lamellae much forked . . . . 7. Alectorolophoides.
   Lamellae simple . . . . 8. Asterophora.

Tribe II. LACTARIEAE

1. Cells of the sporocarp lactiferous, bleeding when cut . . . . 2.
   Cells of the sporocarp non-lactiferous, not bleeding . . . . 5.
2. Lamellae at first pallid, becoming darker with age . 9. Hypophyllum.
   Lamellae uniform in color, unchanging . . . . 3.
3. Pileus dry, glabrous, without a pellicle . . . . 10. Lactaria.
   Pileus pelliculose, usually viscid . . . . 4.
4. Pileus glabrous, slimy-viscid, margin expanded . . . 11. Gloeocybe.
   Pileus tomentose, margin involute . . . . 12. Galorrheus.
5. Pellicle adnate to the pileus or none. . . . . 6.
   Pellicle easily separable . . . . 8.
6. Pileus thick, involute, umbilicate or infundibuliform . 13. Lacterelis.
   Pileus thin, convex to expanded or depressed . . . . 7.

7. Pileus moist or sub-viscid : lamellae forking . . . . 14. DIXOPHYLLUM.
Pileus slimy-viscid : lamellae heterophyllous . . 15. OMPHALOMYCES.
8. Pellicle dry, velvety, or crustose-areolate . . . . 16. RUSSULA.
Pellicle moist or viscid, glabrous : lamellae equal . . . 17. RUSSULINA.

Tribe III. AGARICEAE

1. Lamellae naked even when young : no veil or cortina (Gymnophylli) 2.
Lamellae when young covered by a veil or a cortina or by both (Cryptophylli) . . . . 58.

(*Gymnophylli.*)

2. Lamellae densely hirsute, the edge splitting longitudinally : sessile. 18. HYPONEVRIS.
Lamellae glabrous, the edge entire . . . . 3.
3. Sporocarp tough, coriaceous or woody, reviving : spores white . . 4.
Sporocarp fleshy or membranous, not reviving . . . . 17.
4. Stipe eccentric, lateral or wanting : pileus irregular . . . . 5.
Stipe central : pileus regular or nearly so . . . . 8.
5. Pileus sessile, resupinate when young . . . . 6.
Pileus stipitate or dimidiate, not resupinate . . . . 7.
6. Pileus thin, membranous . . . . 19. PLEUROTOPSIS.
Pileus coriaceous, of uniform texture . . . . 20. SCYTINOTUS.
Pileus coriaceous, with a gelatinous upper layer . . . 21. RESUPINATUS.
7. Stipe lateral or none : lamellae thin, lacerate . . . . . 22. HEMICYBE.
Stipe lateral or none : lamellae thick, entire . . . . 23. PANELLUS.
Stipe eccentric : pileus somewhat fleshy . . . . 24. PANUS.
8. Stipe tubular, slender, with a cartilaginous cortex . . . . 9.
Stipe solid, thick, of uniform texture . . . . 14.
9. Pileus gelatinous : stipe horny . . . . 25. HELIOMYCES.
Pileus membranous or somewhat fleshy. . . . . 10.
10. Margin of pileus straight, appressed to the stipe when young. . . . 11.
Margin of pileus incurved when young . . . . 12.
11. Pileus convex : stipe rigid, radicating or dilated . . . . 26. MYCETINIS.
Pileus plane or umbilicate : stipe filiform, inserted . . 27. MARASMIUS.
12. Pileus with a pellicle of thread-like hairs : hymenium persistent, of well developed lamellae . . . . 28. CRINIPELLIS.
Pileus glandular-hirsute : hymenium deliquescent, of rudimentary lamellae . . . . 29. EOMYCENELLA.
Pileus without a pellicle, glabrous or nearly so . . . . 13.
13. Lamellae adnate or subdecurrent . . . . 30. COLLYBIOPSIS.
Lamellae free or slightly adnexed . . . . 31. SCORTEUS.
14. Cespitose : pileus irregular, subeccentric . . . . . . 32. LENTINELLUS.
Solitary or gregarious, regular . . . . 15.
15. Arising from a tuberous sclerotium . . . . 33. LENTINUS.
Arising from ordinary mycelium . . . . 16.
16. Pileus thin, umbilicate or infundibuliform : lamellae long decurrent. . . . . 34. POCILLARIA.
Pileus thick, convex : lamellae adnate . . . . 35. LENTINULA.

17. Stipe eccentric, lateral or wanting: pileus irregular . . . . 18.
Stipe central: pileus regular . . . . 21.
18. Spores black: pileus tough . . . . 36. ANTHRACOPHYLLUM.
Spores purplish-brown . . . . 37. MELANOTUS.
Spores ochraceous-brown: lamellae separable from trama . 38. TAPINIA.
Spores ochraceous-brown: lamellae fused with trama . 39. PHIALOCYBE.
Spores pink or salmon . . . . 40. CLAUDOPUS.
Spores white or hyaline or lilac tinted . . . . 19.
19. Pileus sessile, at first resupinate . . . . 41. UROSPORA.
Pileus dimidiate, sessile or stipitate . . . . 42. GEOPETALUM.
Pileus stipitate, the stipe eccentric . . . . 20.
20. Lamellae decurrent . . . . 43. CREPIDOTUS.
Lamellae sinuate or adnexed . . . . 44. MICROMPHALE.
(*Stipe central.*)
21. Stipe slender, tubular, with a cartilaginous cortex . . . . 22.
Stipe stout, fleshy, of uniform texture . . . . 46.
22. Spores black . . . . 23.
Spores purplish-brown or dark fuscous . . . . 24.
Spores ochraceous, ferruginous or cinnamon . . . . 26.
Spores pink or salmon. . . . . 33.
Spores white or hyaline . . . . 35.
23. Lamellae deliquescent: pileus membranous-plicate, splitting along the backs of the lamellae . . . . 45. COPRINOPSIS.
Lamellae persistent: margin of pileus appressed to stipe when young. 46. PSATHYRELLA.
24. Margin of pileus appressed to the stipe when young. 47. ASTYLOSPORA.
Margin at first incurved . . . . 25.
25. Lamellae decurrent . . . . 48. DECONICA.
Lamellae adnate or adnexed. . . . . 49. PSILOCYBE.
(*Spores ochraceous.*)
26. Lamellae deliquescent (= *Bolbitius*) . . . . 50. MYCENA.
Lamellae persistent . . . . 27.
27. Margin of pileus straight and appressed to stipe when young . . . 28.
Margin of pileus incurved when young . . . . 31.
28. Lamellae adnate or adnexed . . . . 29.
Lamellae free . . . . 51. PLUTEOLUS.
29. Pileus plicate, splitting on the back of the lamellae . . 52. GALERELLA.
Pileus even or slightly striate . . . . 30.
30. Pileus conic-campanulate: lamellae attached to a conical enlargement of apex of stipe . . . . 53. CONOCYBE.
Pileus convex or broadly companulate: lamellae squarely adnate: apex of stipe not enlarged . . . . 54. GALERINA.
31. Lamellae decurrent . . . . 55. TUBARIA.
Lamellae adnate, adnexed or nearly free . . . . 32.
32. Spores small, bright-colored, ochraceous or ferruginous . 56. NAUCORIA.
Spores large, dull, fuscous or cinnamon . . . . 57. BULLA.
(*Spores pink.*)
33. Margin of pileus at first straight and appressed to stipe . 58. NOLANEA.

Margin of pileus incurved when young . . . . 34.
34. Lamellae decurrent . . . . 59. ECCILIA.
Lamellae adnate or adnexed . . . . 60. LEPTONIELLA.
(*Spores white.*)
35. Margin at first straight and appressed to stipe . . . . 36.
Margin at first incurved . . . . 43.
36. Pileus plicate, splitting down the backs of the lamellae.
61. LEPTOMYCES.
Pileus even or striate, not splitting as above . . . . 37.
37. Pileus umbilicate: lamellae decurrent . . . . 38.
Pileus convex, often umbonate: lamellae adnate or adnexed . . . 39.
38. Lamellae thick, obtuse, narrow (*Cantharellus*-like) . . 62. DELICATULA.
Lamellae acute, broad . . . . 63. OMPHALOPSIS.
39. Base of slender stipe deeply inserted in matrix . . . . . 64. INSITICIA.
Base of stipe dilated into a disc or bulbil . . . . 65. BASIDIOPUS.
Stipe not as above, base normal or radicating . . . . 40.
40. Stipe glutinous-viscid . . . . 66. COLLOPUS.
Stipe and lamellae lactiferous, bleeding when cut . . 67. GALACTOPUS.
Stipe neither glutinous nor lactiferous . . . . 41.
41. Cespitose, lignatile: stipe tough, radicating . . . 68. STEREOPODIUM.
Solitary or gregarious: stipe often fragile . . . . 42.
42. Lamellae white, thin, gray or reddish : stipe slender, fragile, radicating . . . . 69. LINOPODIUM.
Lamellae unchanging, often bright colored : stipe firmer, not radicating . . . . 70. PRUNULUS.
43. Lamellae decurrent : pileus umbilicate . . . . 71. OMPHALINA.
Lamellae adnate or adnexed . . . . 44.
44. Pileus hygrophanous : lamellae cinereous . . . . . 72. TEPHROPHANA.
Pileus not hygrophanous : lamellae white or tinted . . . . 45.
45. Stipe slender, not conspicuously striate . . . . . . 73. COLLYBIDIUM.
Stipe stout, sulcate or fibrillose-striate . . . . 74. GYMNOPUS.
(*Stipe fleshy.*)
46. Spores purplish-brown : lamellae free . . . . 75. PILOSACE.
Spores ochraceous, etc. . . . . 47.
Spores pink or salmon . . . . 50.
Spores white or hyaline . . . . 51.
47. Lamellae easily separable from the pileus . . . . 48.
Lamellae concrete with the pileus . . . . 49.
48. Spores sordid-whitish : lamellae adnexed . . . . 76. LEPISTA.
Spores ferruginous : lamellae decurrent . . . . 77. PAXILLUS.
49. Lamellae decurrent, anastamosing at base : spores elongate.
78. PHYLLOPORUS.
Lamellae decurrent, distinct : spores elliptical . . . . 79. GYMNOCYBE.
Lamellae adnate or adnexed . . . . 80. HEBOLOMATIS.
(*Spores pink.*)
50. Lamellae decurrent (= *Clitopilus*) . . . . 81. ORCELLA.
Lamellae sinuate or adnexed . . . . 82. ENTOLOMA.
Lamellae free . . . . 83. PLUTEUS.
(*Spores white.*)

51. Lamellae of waxy consistency . . . . 52.
Lamellae fleshy, not waxy. . . . . 53.
52. Pileus firm, moist but not viscid : lamellae broad, arcuate.
84. CAMAROPHYLLUS.
Pileus less firm, viscid : lamellae often bright colored.
85. HYDROPHORUS.
53. Lamellae decurrent . . . . 54.
Lamellae sinuate or adnexed . . . . 57.
54. Cespitose : pileus convex, often umbonate : lamellae unequally decurrent. . . . . 86. MONADELPHUS.
Solitary or gregarious . . . . 55.
55. Lamellae long-decurrent : pileus thin, infundibuliform. 87. OMPHALIUS.
Lamellae short-decurrent : pileus convex or depressed. . . . . . . 56.
56. Spores elliptical, smooth . . . . 88. CLITOCYBE.
Spores globose, echinulate. . . . . 89. LACCARIA.
57. Pileus moist, hygrophanous, usually thin . . . . . . 90. MELANOLEUCA.
Pileus viscid, usually thick . . . . 91. GLUTINASTER.

(*Cryptophylli.*)

58. Veil and cortina poorly developed or evanescent, leaving neither annulus nor volva . . . . 59.
Cortina (or sometimes the veil) strongly developed : stipe annulate, no volva . . . . 81.
Veil strongly developed, forming a volva : cortina and annulus none. 95.
Veil and cortina both strongly developed, forming both volva and annulus. . . . . 97.
59. Sporocarp tough, reviving, resupinate . . . . 92. TECTELLA.
Sporocarp tough, reviving, with a central stipe . . . . 93. LENTODIUM.
Sporocarp fleshy or membranous, putrescent . . . . 60.
60. Stipe slender, tubular, with a cartilaginous cortex. . . . . 61.
Stipe usually stouter, fleshy or fibrous, of uniform texture. . . . . 63.
61. Spores black : margin of pileus at first incurved . 94. CAMPANULARIUS.
Spores purplish-black or dark fuscous : lamellae subdecurrent.
95. DELITESCOR.
Spores ochraceous, etc. . . . . 62.
62. Margin of pileus at first straight and appressed . . . . 96. GALERULA.
Margin of pileus at first incurved . . . . 97. FLAMMULASTER.
63. Spores black : lamellae deliquescent . . . . 98. COPRINELLUS.
Spores black or fuscous, elongate : lamellae decurrent. 99. GOMPHIDIUS.
Spores purplish-brown or dark fuscous . . . . 64.
Spores ochraceous, ferruginous or cinnamon . . . . 65.
Spores white . . . . 80.
(*Spores purplish-brown.*)
64. Pileus hygrophanous : stipe slender, fragile . . . 100. HYPHOLOMOPSIS.
Pileus viscid or squamulose : scattered or subcespitose.
101. DRYOSOPHILA.
Pileus dry, glabrous, firm : densely cespitose . . . . 102. HYPHOLOMA.
(*Spores ochraceous.*)

65. Cortina poorly developed or none, the lamellae at first covered by the veil . . . . 66.
Cortina of loosely woven, subpersistent, silky threads . . . . . . 74.
66. Pileus moist or viscid . . . . 67.
Pileus dry, scaly, fibrillose or silky . . . . 70.
67. Lamellae adnate or decurrent . . . . 68.
Lamellae sinuate or adnexed . . . . 69.
68. Pileus moist, usually hygrophanous . . . . 103. RYSSOSPORA.
Pileus glutinous or viscid . . . . 104. VISCULUS.
69. Stipe slender, fibrous, not whitened above (= *Inocybe*).
105. RIPARTITES.
Stipe stouter, fleshy, the apex whitened (= *Hebeloma*).
106. PICROMYCES.
70. Lamellae adnate-decurrent: stipe fleshy or woody . 107. GYMNOPILUS.
Lamellae sinuate or adnexed . . . . 71.
71. Pileus silky, not fibrillose or scaly . . . . 72.
Pileus fibrillose or scaly . . . . 73.
72. Pileus even, not rimose . . . . 108. ASTROSPORINA.
Pileus radiately rimose . . . . 109. AGMOCYBE.
73. Stipe fibrillose: pileus fibrillose or appressed-squamose.
110. INOCYBIUM.
Stipe squarrose: pileus squarrose-squamose . . . . . . 111. INOCYBE.
74. Veil absent or very poorly developed . . . . 75.
Veil present, clearly evident, at least when young, persistent on stem. 79.
75. Pileus hygrophanous: stipe slender . . . . 112. HYDROCIBIUM.
Pileus dry or viscid . . . . 76.
76. Stipe slender, fibrous: pileus dry, at first villous . . 113. DERMOCYBE.
Stipe stouter, fleshy . . . . 77.
77. Pileus dry, often squamulate . . . . 114. INOLOMA.
Pileus viscid . . . . 78.
78. Stipe elongated: cortina attached medially . . . . 115. PHLEGMACIUM.
Stipe short, bulbous: cortina attached to bulb . . . 116. BULBOPODIUM.
79. Veil viscid: stipe and pileus viscid . . . . 117. SPHAEROTRACHYS.
Veil membranous: stipe peronate: pileus usually hygrophanous.
118. CORTINARIUS.

(*Spores white.*)

80. Pileus dry, fibrillose: veil fibrillose . . . . 119. MONOMYCES.
Pileus viscid-glutinous: veil glutinous . . . . . . 120. HYGROPHORUS.

(*Annulus present.*)

81. Stipe slender, tubular, with a cartilaginous cortex . . . . 82.
Stipe fleshy, of uniform texture . . . . 83.
82. Spores black: lamellae deliquescent (= *Coprinus*) . 121. ANNULARIUS.
Spores black: lamellae persistent (= *Anellaria*) . . . 122. PANAEOLUS.
Spores ochraceous, etc. . . . . 123. PHOLIDOTOPSIS.
83. Spores black: lamellae deliquescent . . . . 124. COPRINUS.
Spores purplish-brown or dark fuscous . . . . 84.
Spores ochraceous, etc. . . . . 85.
Spores pink . . . . 87.

Spores white . . . . 88.
84. Lamellae attached . . . . 125. STROPHARIA.
Lamellae free . . . . 126. AGARICUS.
85. Pileus hygrophanous . . . . 127. PHOLIOTINA.
Pileus dry . . . . 86.
86. Stipe glabrous or fibrillose . . . . 128. PHOLIOTA.
Stipe squarrose-scaly . . . . 129. HYPODENDRUM.
87. Lamellae free . . . . 130. CHAMAEOTA.
(*Spores white.*)
88. Stipe more or less eccentric . . . . 131. PLEUROTUS.
Stipe central . . . . 89.
89. Stipe slender, tubular, with a cartilaginous cortex: lamellae adnate.
132. CHAMAEMYCES.
Stipe fleshy, of uniform texture . . . . 90.
90. Lamellae decurrent . . . . 133 POLYMYCES.
Lamellae sinuate or adnexed . . . . 134. SPHAEROCEPHALUS.
Lamellae free . . . . 91.
91. Pileus viscid . . . . 135. LIMACELLA.
Pileus dry . . . . 92.
92. Annulus inferior: cuticle of pileus granular with swollen vesicles.
136. CYSTODERMA.
Annulus medial or superior . . . . 93.
93. Pileus glabrous: stipe slender, tubular . . . . 137. FUSISPORA.
Pileus floccose or squamose: stipe fleshy . . . . 94.
94. Annulus fixed: stipe peronate . . . . 138. MASTOCEPHALUS.
Annulus movable: stipe glabrate . . . . 139. LEPIOTA.
(*Volva, no annulus.*)
95. Spores black . . . . 140. CLARKEINDA.
Spores ochraceous . . . . 141. LOCELLINA.
Spores pink (= *Volvaria*) . . . . 142. PSEUDOFARINACEUS.
Spores white . . . . 96.
96. Volva closely adnate to stipe and pileus, breaking into scales.
143. AMANITELLA.
Volva free, basal, cup-like or with a free limb . . . . . 144. VAGINATA.
(*Volva and annulus.*)
97. Spores ochraceous . . . . 145. ROZITES.
Spores white . . . . 98.
98. Volva adnate to stipe and pileus, breaking into scales.
146. VENENARIUS.
Volva free, basal, cup-shaped or with a free limb . . 147. LEUCOMYCES.

DESCRIPTIONS OF GENERA

Family AGARICACEAE

Basidiomycetous fungi in which the hymenium covers radiating plates called lamellae or lamellae-like folds of the substance of the pileus.

Tribe I. Cantharelleae

Hymenium covering obtuse lamellae-like folds of the substance of the pileus.

1. PLICATURA Peck, Ann. Rep. N. Y. State Mus. **24**: 75. 1872.

Reviving, persistent: pileus sessile or resupinate, tough: lamellae obtuse, fold-like: spores white or hyaline: veil none: stipe none.

Type, *Trogia Alni* (Peck) Sacc. (Syll. **5**: 637.)

The sessile species of *Trogia* and *Xerotus* as given in the *Sylloge* should be sought here.

2. XEROTINUS Reichenb. Consp. 14. 1828.

Xerotus Fries. 1828. Not *Xerotus* R. Brown. 1810.

Reviving, persistent: pileus tough, stipitate: lamellae obtuse, fold-like, usually furcate: spores white or hyaline: veil none: stipe central, thick, homogeneous with the pileus.

Type, *Xerotus afer* Fries. (Syll. **5**: 632.)

Fries first used the name *Xerotes* in Syst. Orb. Veg. 78. 1825, but without citing species. In the *Elenchus* he changed it to *Xerotus*, which is only a different ending for the same word. According to our rules Reichenbach was correct in renaming it. The sessile species of the *Sylloge* are here excluded.

3. DICTYOLUS Quél. Enchr. Fung. 139. 1886.

Corniola S. F. Gray. 1821. Not *Corniola* Adans. 1763.

Leptoglossum Karst. 1879. Not *Leptoglossa* DC. 1841.

Putrescent: pileus eccentric, dimidiate or resupinate, fleshy: lamellae obtuse, fold-like: spores white or hyaline: veil none: stipe lateral or wanting.

Type, *Cantharellus muscigenus* (Bull.) Fries. (Syll. **5**: 495.)

As here defined this includes *Cantharellus*, § *Pleuropus* and § *Resupinatus*, of the *Sylloge*.

4. MERISMODES gen. nov.

Putrescent, densely connate-cespitose: pileus fleshy, ir-

regular: lamellae reduced to obscure folds: spores white or hyaline: veil none: stipes irregular, the bases fused.

Type, *Cantharellus fasciculatus* Schw. Trans. Am. Phil. Soc. II. 4: 153. 1832. (Syll. 5: 495.)

This equals *Cantharellus* § *Merisma*, of the *Sylloge*. This name cannot be utilized, however, since the type of *Merisma* Pers. belongs in the Thelephoraceae.

5. TROGIA Fries, Gen. Hymen. 10. 1836.

Putrescent: pileus membranous, deeply infundibuliform or tubular: hymenium plicate: spores white or hyaline: veil none: stipe central, usually tough.

Type, *T. Montagnei* Fries. (Syll. 5: 636.)

I have here followed Patouillard (Tax. Hymén. 127) in grouping the membranaceous species of *Xerotus* with *Trogia* and have added the thin membranaceous species found under *Cantharellus* in the *Sylloge*.

6. TURBINELLUS gen. nov.

Putrescent: pileus turbinate, rugose-infundibuliform, thick, fleshy-suberous: hymenium covering irregular, forking and reticulating folds: spores white or hyaline: stipe central, short, thick.

Type, *Cantharellus floccosus* Schw. Trans. Am. Phil. Soc. II. 4: 153. 1832. (Syll. 5: 491.)

Thus far only three species are known, all from North America. They constitute a striking and well-marked genus which seems to have more in common with the club-shaped species of *Craterellus* than with the following genus where they have always been placed.

7. ALECTOROLOPHOIDES Batt. Fung. Hist. 39. 1755.

Chantarel Adans. (typonym). 1763.

Merulius Hall. (typonym). 1768.

Cantarellus Pers. (typonym). 1794.

Cantharellus Fries (typonym). 1838.

Putrescent: pileus convex or depressed, fleshy: hymenium covering obtuse, much forked, lamella-like folds: spores white or hyaline: stipe central, fleshy.

Type, *Cantharellus cibarius* Fries. (Syll. 5: 482.)

These are the typical chanterelles. It is unfortunate that the familiar generic name of *Cantharellus* is antedated.

8. ASTEROPHORA Ditmar, in Link, Jour. Bot. Schrad. 3: 17. 1809.

Nyctalis Fries (metonym). 1825. Type, *N. parasitica* (Bull.) Fries. (Syll. 5: 502.)

Sphaeropus Paulet (typonym). 1835.

Putrescent, usually parasitic: pileus fleshy, convex or depressed, bearing conidia: hymenium covering lamella-like folds, simple, not forked; spores white or hyaline: veil none: stipe central, fleshy.

Type, *Nyctalis asterophora* Fries. (Syll. 5: 501.)

Tribe II. LACTARIEAE

Hymenium covering true lamellae. Cells of the sporocarp in part swollen, vesicular: spores white or yellow.

9. HYPOPHYLLUM Paulet, Ic. 11. 1793–1812.

Lactariella Schröt., Krypt. Fl. Schles. 3^1: 544 (metonym). 1889. Type, *Lactarius fuliginosus* Fries. (Syll. 5: 446.)

Putrescent: cells of the sporocarp vesicular, lactiferous: pileus fleshy, convex or depressed, viscid, pruinose or squamulose: lamellae adnate or decurrent, becoming darker and pruinose with age: spores white or yellowish, usually globose, echinulate: veil none: stipe central, fleshy.

Type, *Lactarius rufus* Fries. (Syll. 5: 442.)

The genus as here defined is practically equivalent to *Lactarius*, Tribe 3, *Russularia*, of the *Sylloge*. To make the treatment fully consistent the viscid species should perhaps be separated from the dry squamulose ones. The slightly yellowish color of the spores in some of the species hardly seems a character of generic importance.

10. LACTARIA Pers. Tent. Disp. Fung. 63. 1797.

Lactifluus Roussel (typonym). 1806.

Lactarius S. F. Gray (typonym). 1821.

Putrescent: cells of the sporocarp vesicular, lactiferous: pileus fleshy, convex or depressed, dry, glabrous, epelliculose: lamellae adnate or decurrent, color unchanging: spores white or whitish, usually globose, echinulate: veil none: stipe central, fleshy.

Type, *Lactarius piperatus* Fries.

The genus is taken to equal *Lactarius*, Tribe 1, § 3, *Piperati*, of the *Sylloge*.

11. GLOEOCYBE gen. nov.

Putrescent: cells of sporocarp vesicular, lactiferous: pileus fleshy, depressed or infundibuliform, slimy-viscid, margin expanded: lamellae adnate or decurrent, unchanging: spores white or whitish, globose, echinulate: veil none: stipe central, fleshy.

Type, *Lactarius insulsus* Fries, Epicr. 336. 1838. (Syll. 5: 427.)

This equals *Lactarius*, Tribe 1, § 2, *Limacini*, of the *Sylloge*.

12. GALORRHEUS Fries, Syst. Orb. Veg. 75. 1825.

Putrescent: cells of sporocarp vesicular, lactiferous: pileus fleshy, depressed or infundibuliform, moist or viscid, tomentose, the margin at first strongly involute: lamellae adnate or decurrent, unchanging: spores white or whitish, globose, echinulate: veil none: stipe central, stout, fleshy.

Type, *Lactarius controversus* Fries. (Syll. 5: 426.)

As here defined this equals *Lactarius*, Tribe 1, § 1, *Tricholomoidei*, of the *Sylloge*. The name *Galorrheus* was first used by Fries as a subgenus in 1818 (Obs. Myc. 2: 188). Why he abandoned it in his later works for *Lactarius* is not apparent.

13. LACTARELIS gen. nov.

Putrescent: cells of the sporocarp vesicular, non-lactiferous: pileus fleshy, thick, moist or subviscid, pellicle non-separable or none, umbilicate or infundibuliform, margin at first involute: lamellae adnate-decurrent, heterophyllous:

spores white, usually globose, echinulate: veil none: stipe central, firm, solid.

Type, *Russula nigricans* (Bull.) Fries, Epicr. 350. 1838. (Syll. 5: 453.)

This equals *Russula* § 1, *Compactae*, of the *Sylloge*. The species closely resembles *Galorrheus* except for the lack of a milky secretion.

14. DIXOPHYLLUM gen. nov.

Putrescent: cells of the sporocarp vesicular, non-lactiferous: pileus fleshy, thin, epelliculate, moist or subviscid, convex or depressed: lamellae adnate or subdecurrent, usually narrow, forking and somewhat heterophyllous: spores white or yellow, usually globose, echinulate: veil none: stipe central, fleshy, becoming somewhat spongy but usually solid.

Type, *Russula furcata* (Pers.) Fries, Epicr. 352. 1838. (Syll. 5: 456.)

This is *Russula* § 2, *Furcatae*, of the *Sylloge*, but it should probably also include some of the species there given under § 4, *Heterophyllae*. Some of the species approach rather close to *Russulina*, but on the whole it is a sufficiently well-marked group.

15. OMPHALOMYCES Batt. Fung. Hist. 36. 1755.

Putrescent: cells of sporocarp vesicular, non-lactiferous: pileus fleshy, thin, slimy-viscid, convex or depressed, striate: lamellae adnate, heterophyllous, sometimes forking, narrow: spores white or whitish, globose or elliptical, usually echinulate: veil none: stipe central, stout, usually spongy.

Type, *Russula galochroa* Fries. (Syll. 5: 466).

This is intended to represent in part at least *Russula* § 4, *Heterophyllae*, of the *Sylloge*. It is unfortunate that the nomenclatorial type species is poorly known and may belong elsewhere, in which case the genus must be renamed. *Russula foetens* Pers. may be considered as the representative species. It remains for European mycologists to determine what *Russula galochroa* Fries really is.

16. RUSSULA Pers. Obs. Myc. 1: 100. 1796.

Putrescent: cells of the sporocarp vesicular, non-lactiferous: pileus fleshy, convex or depressed, dry, velvety, or the pellicle breaking into areolate, crustose scales, the margin obtuse, seldom striate: lamellae adnate, broad, somewhat heterophyllous or sometimes forking: spores white or yellow, usually globose, echinulate: veil none: stipe central, fleshy, solid or spongy, sometimes hollow.

Type, *Russula lepida* Fries. (Syll. 5: 461.)

This is *Russula* § 3, *Rigidae*, of the *Sylloge*. It forms a well-marked group, though some of the species approach *Russulina* rather closely.

17. RUSSULINA Schroet. Krypt. Fl. Schles. 3^1: 550. 1889.

Putrescent: cells of sporocarp vesicular, non-lactiferous: pileus fleshy, fragile, convex or depressed, moist or viscid, glabrous but with a thin separable pellicle, usually tuberculate-striate: lamellae adnate, normally all equal, rather broad: spores white, yellow or subochraceous, usually globose, echinulate: veil none: stipe central, fleshy, fragile, often hollow.

Type, *Russula integra* Fries. (Syll. 5: 475.)

This is *Russula* § 5, *Fragiles*, of the *Sylloge*. It is a large and natural group. Schroeter's genus was founded on the color of the spores, but this character is not here accepted as of generic importance.

Tribe III. Agariceae

Hymenium covering true lamellae. Cells of the sporocarp all slender, elongated: spores black, brown, pink or white.

§ 1. *Gymnophylli*

Lamellae naked even when young: no veil or cortina.

18. HYPONEVRIS Paulet, Ic. 1: Pl. 1: 3–5. 1793–1812.
Schizophyllus Fries, Obs. Myc. 1: 103 (typonym). 1815.
Flabellaria Pers. Champ. Comest. 105 (typonym). 1818.

Scaphophorum Ehrenb. Horae Phys. Berol. 1: 94 (typonym). 1820.

Schizophyllum Fries, Syst. Myc. 1: 330 (typonym). 1821.

Apus S. F. Gray, Nat. Arr. Brit. Pl. 1: 617 (typonym). 1821.

Schizonia Pers. Myc. Eur. 3: 14 (typonym). 1828.

Sporocarp tough, coriaceous, reviving: pileus dimidiate: lamellae densely hirsute, the edge splitting longitudinally, the parts becoming revolute: spores white or hyaline: veil none: stipe none or a mere lateral prolongation of the pileus.

Type, *Schizophyllum commune* Fries. (Syll. 5: 655.)

This well-marked genus has had many names, all based on the same type species, *Agaricus alneus* L.

19. PLEUROTOPSIS (P. Henn.) gen. nov.

Marasmius § *Pleurotopsis* P. Henn in E. & P. Nat. Pfl. 1[1**]: 226. 1898.

Sporocarp thin, membranous, reviving: pileus sessile, at first resupinate: lamellae radiating from a central or eccentric point: spores white or hyaline: veil none: stipe none.

Type, *Marasmius spodoleucus* Berk. Outlines Brit. Fung. 224. 1860. (Syll. 5: 567.) Ann. Nat. Hist. 1859.

This corresponds to *Marasmius* § 3, *Apus*, of the *Sylloge*.

20. SCYTINOTUS Karst. Hattsv. 97. 1879.

Sporocarp tough, coriaceous, reviving: pileus sessile, at first resupinate, of uniform texture: lamellae radiating from a central or eccentric point: spores white or hyaline: veil none: stipe none.

Type, *Panus ringens* Fries. (Syll. 5: 628.)

This corresponds in a general way to the resupinate sections of *Panus* and *Lentinus* as given in the *Sylloge*.

21. RESUPINATUS (Nees) S. F. Gray, Nat. Arr. Brit. Pl. 1: 617. 1821.

Sporocarp tough, coriaceous, reviving: pileus sessile, at first resupinate, with a gelatinous upper stratum: lamellae from a central or eccentric point: spores white or hyaline: veil none: stipe none.

Type, *Pleurotus applicatus* (Batsch). (Syll. 5: 379.)

This is *Pleurotus* § 3, *Resupinata*, subsection **, of the *Sylloge*. It differs from *Scytinotus* solely in the gelatinous upper layer of the pileus. It is a well-marked group easily distinguished from the other segregates of *Pleurotus* by the tough, reviving pileus.

22. HEMICYBE Karst. Hattsv. 248. 1879.

Sporocarp tough, coriaceous, reviving: pileus dimidiate: lamellae from a lateral point, thin, lacerate: spores white or hyaline: veil none: stipe short, lateral or none.

Type, *Lentinus ursinus* Fries. (Syll 5: 608.)

This corresponds to *Lentinus* series B, *Pleuroti*, of the *Sylloge*.

23. PANELLUS Karst. Hattsv. 96. 1879.

Rhipidium Wallr. Fl. Crypt. Germ. 2: 742. 1833. Not *Ripidium* Trinn. 1820.

Sporocarp tough, coriaceous or woody, reviving: pileus dimidiate: lamellae from a lateral point, thick, entire, subobtuse: spores white or hyaline: veil none: stipe lateral or none.

Type, *Panus stypticus* (Bull.) Fries. (Syll. 5: 622.)

This is *Panus* §**, of the *Sylloge*. It is difficult to find technical characters by which to separate this from *Hemicybe*, but the two types are sufficiently distinct.

24. PANUS Fries, Epicr. Myc. 396. 1838.

Sporocarp coriaceous, often thick and fleshy, reviving: pileus irregular, convex or depressed: lamellae adnate or decurrent: spores white or hyaline: veil none: stipe eccentric, usually stout, solid.

Type, *P. farneus* Fries. (Syll. 5: 614.)

As here defined the genus excludes the dimidiate and resupinate sections. It differs from the segregates of *Lentinus* solely in the irregular pileus and eccentric stipe. The character of the lamellae, whether thin and lacerate or thick and entire, cannot be here used as a generic character. Many species of *Pocillaria* have entire lamellae.

25. HELIOMYCES Lév. Ann. Sci. Nat. Bot. III. **2**: 177. 1844.

Pileus thin, subgelatinous, reviving: lamellae adnexed, adnate or decurrent: spores white or whitish: veil none: stipe central, slender, tubular, horny.

Type, *H. elegans* Lév. (Syll. **5**: 569.)

A small, poorly known tropical genus, here taken in the same sense as in the *Sylloge*.

26. MYCETINIS gen. nov.

Marasmius § *Mycinopsis* Schroet. Krypt. Fl. Schles. $\mathbf{3}^1$: 558. 1889.

Pileus thin, membranous, reviving, the margin at first appressed not incurved, convex or campanulate: lamellae free, adnexed or adnate: spores white: veil none: stipe central, rigid, horny, radicating or dilated.

Type, *Marasmius alliaceus* (Jacq.) Fries, Epicr. 383. 1838. (Syll. **5**: 534.)

This includes *Marasmius* § *Mycena*, subsection *Chordales*, of the *Sylloge*.

27. MARASMIUS Fries, Gen. Hymen. 9. 1836.

Pileus thin, membranous, reviving, the margin at first appressed not incurved, plane or umbilicate: lamellae free, adnexed or adnate, often joined in a collar: spores white: veil none: stipe central, filiform, flaccid, inserted.

Type, *M. androsaceus* (L.) Fries. (Syll. **5**: 543.)

As here defined this includes only the subsection *Rotulae*, of the *Sylloge*. It is probable that a careful study of the many species included under the old genus *Marasmius* would result in even further segregation.

28. CRINIPELLIS Pat. Jour. Bot. **3**: 336. 1889.

Pileus thin, reviving, margin incurved, pellicle of thread-like hairs: lamellae adnate or adnexed: spores white: veil none: stipe central, slender, tubular.

Type, *Collybia stipitaria* Fries. (Syll. **5**: 216.)

The limits of this genus are not well known. In his *Essai*

Taxonomique sur les Hyménomycètes, p. 143, Patouillard includes here species of *Collybia*, *Marasmius*, and *Lentinus*, some of which would be excluded under the above definition.

29. EOMYCENELLA Atk. Bot. Gaz. **34**: 37. 1902.

Pileus thin, of interlacing threads, trama rudimentary (reviving?): lamellae rudimentary, often wanting, hymenium deliquescent: spores white: veil none: stipe very slender, fleshy.

Type, *E. echinocephala* Atk. *loc. cit.*

The genus is monotypic and its true relationship is very doubtful. The one known species is very minute, the pileus being less than 1 mm. broad and the stipe only 3/8 mm. high. It is figured as glandular-hirsute throughout.

30. COLLYBIOPSIS (Schroet.) gen. nov.

Marasmius § *Collybiopsis* Schroet. Krypt. Fl. Schles. **3**[1]: 559. 1889.

Pileus thin, reviving, margin at first incurved, epelliculose: lamellae adnate or decurrent: spores white: veil none: stipe central, tubular, slender.

Type, *Marasmius ramealis* (Bull.) Fries, Epicr. 381. 1838. (Syll. **5**: 531.)

This corresponds to *Marasmius* § *Collybia*, subsection *Calopodes*, of the *Sylloge*. It is distinguished from *Scorteus* by the adnate or decurrent lamellae.

31. SCORTEUS gen. nov.

Pileus thin, but somewhat fleshy, reviving, the margin at first incurved, epelliculose, usually glabrous: lamellae free or slightly adnexed: spores white: veil none: stipe central, tubular or of compacted fibers, usually elongated.

Type, *Marasmius oreades* Fries, Epicr. 375. 1838. (Syll. **5**: 510.)

In the segregations heretofore proposed for *Marasimus* no name has been given to this group. As here understood it includes § *Collybia* and subsections *Scortei* and *Tergini*, of the *Sylloge*.

32. LENTINELLUS Karst. Hattsv. 246. 1879.

Sporocarp coriaceous, reviving, densely cespitose: pileus more or less irregular from crowding: lamellae adnate or decurrent: spores white or hyaline: veil none: stipe central or subcentral, the bases connate.

Type, *Lentinus umbellatus* Fries. (Syll. 5: 594.)

This includes the cespitose species of § *Cochleati* and § *Cornucopioides* of *Lentinus*, as given in the *Sylloge*. It is clearly distinct from the other segregates of *Lentinus*, but probably intergrades with cespitose species of *Clitocybe*, of the *Sylloge*, which are here placed in *Monadelphus*.

33. LENTINUS Fries, Syst. Orb. Veg. 77. 1825.

Lentinus § *Scleroma* Fries, Nov. Symb. 35. 1851.

Sporocarp coriaceous, reviving, arising from a tuberous sclerotium: pileus thin, deeply umbilicate or infundibuliform: lamellae decurrent: spores white or hyaline: veil none: stipe central, solid.

Type, *L. tuber-regium* Fries. (Syll. 5: 604.)

As here defined this is a strictly tropical genus and none of the species has been certainly identified from North America.

34. POCILLARIA (P. Browne) O. Kuntze, Rev. Gen. 2: 865. 1891.

Sporocarp coriaceous, reviving, arising from a mycelium of the usual form: pileus thin, umbilicate or infundibuliform: lamellae decurrent: spores white or hyaline: veil none: stipe central, solid, woody.

Type, *Lentinus crinitus* (L.) Fries. (Syll. 5: 576.)

This is here taken to include the central-stemmed species of *Lentinus* § *Criniti*, § *Pulverulenti* and parts of § *Cochleati* and § *Cornucopioides*. It is distinguished from *Lentinus* by the absence of tuberous sclerotia and from the following genus by the thin, infundibuliform pileus and decurrent lamellae. The species are mostly tropical.

35. LENTINULA gen. nov.

Sporocarp coriaceous, reviving: pileus thick, convex or

slightly depressed: lamellae adnate: spores white: veil none: stipe central, solid, woody.

Type, *Lentinus cubensis* B. & C. Jour. Linn. Soc. Bot. **10**: 302. 1868. (Syll. **5**: 605.)

This is a small genus distinguished from *Lentodium* solely by the absence of a veil. If this organ should be discovered by the study of young specimens, then this name would become a synonym under that genus.

36. ANTHRACOPHYLLUM Cesati, Myc. Borneo 3. 1879.

Sporocarp fleshy, putrescent: pileus dimidiate: lamellae from a lateral point, unequal: spores black: veil none: stipe none or very short and lateral.

Type, *A. nigrita* (Lév.) Kalchbr. (Syll. **5**: 1139.)

There is some doubt as to the validity of this genus. Patouillard (Tax. Hymén. 146) says that the spores are colorless. The single species referred to it is not known to me.

37. MELANOTUS Pat. Tax. Hymén. 175. 1900.

Sporocarp fleshy, putrescent: pileus dimidiate; lamellae radiating from a lateral point: spores purplish-brown: veil none: stipe none.

Type, *Crepidotus bambusianus* Pat. (Syll. **11**: 63.)

No species of this genus has been reported from North America, but an undescribed one occurs in Cuba.

38. TAPINIA (Fries) Karst. Hattsv. 452. 1879.

Sporocarp fleshy but firm, putrescent: pileus dimidiate or resupinate: lamellae from a lateral point, often anastomosing, separable from the pileus: spores ochraceous-brown: veil none: stipe none.

Type, *Paxillus panuoides* Fries. (Syll. **5**: 889.)

Besides being distinguished by the separable, anastomosing lamellae, these plants are usually larger and tougher than those of the next genus.

39. PHIALOCYBE Karst. Hattsv. 415. 1879.

Crepidotus (Fries) Quél. (homonym). 1872. Type, *C.*

mollis (Schaeff.) Quél. (Syll. 5: 877.) Not *Crepidotus* S. F. Gray. 1821.

Derminius (Fries) Schroet. (metonym). 1889. Type, *Crepidotus scalaris* Fries. (Syll. 5: 878.)

Sporocarp soft, fleshy, putrescent: pileus irregular, often dimidiate or resupinate: lamellae neither separable nor anastomosing: spores ochraceous-brown or cinnamon: veil none: stipe eccentric, lateral or wanting.

Type, *Crepidotus epibryus* Fries. (Syll. 5: 881.)

The use of the generic characters adopted in the corresponding series of white-spored species would result in considerable segregation. For the present it seems more convenient to hold the species together.

40. CLAUDOPUS (W. G. Sm.) Gillet, Champ. Fr. 1: 426. 1878.

Sporocarp fleshy, putrescent: pileus irregular, dimidiate or resupinate: lamellae neither separable nor anastomosing: spores pink or salmon: veil none: stipe eccentric, lateral, or wanting.

Type, *C. variabilis* (Pers.) Gillet. (Syll. 5: 733.)

Here again a strictly consistent treatment would require needless segregation.

41. UROSPORA Fayod, Ann. Sci. Nat. Bot. VII. 9: 328. 1889.

Phyllotus Karst. Hattsv. 92. 1879. Not *Phyllota* Benth. 1837. (Type, *Pleurotus porrigeus* (Pers.). (Syll. 5: 374).)

Sporocarp fleshy or membranous, putrescent: pileus sessile, at first resupinate: lamellae from a central or eccentric point: spores white: veil none: stipe none.

Type, *Pleurotus striatulus* (Fries). (Syll. 5: 382.)

With age some of the larger species become pronouncedly dimidiate and might easily be confused with the next genus. At first, however, all are clearly resupinate. As here used this genus corresponds to *Pleurotus* § 3, *Resupinati*, subsections * and ***, of the *Sylloge*.

42. GEOPETALUM Pat. Hymén. Eur. 127. 1887.

Sporocarp fleshy, putrescent: pileus dimidiate, not at first resupinate: lamellae from a lateral point: spores white: veil none: stipe none or a lateral prolongation of the margin of the pileus.

Type, *Pleurotus petaloides* (Bull.). (Syll. 5: 361.)

This probably intergrades to some extent with the next genus but the groups as a whole are sufficiently distinct. As here used it corresponds in a general way with *Pleurotus* § *Dimidiati*, of the *Sylloge*.

43. CREPIDOTUS (Nees) S. F. Gray, Nat. Arr. Brit. Pl. 1: 616. 1821. Not *Crepidotus* (Fries) Quél. 1872.

Sporocarp fleshy, putrescent: pileus irregular: lamellae long-decurrent: spores white or lilac tinted: veil none: stipe eccentric, stout, solid.

Type, *Pleurotus ostreatus* (Jacq.). (Syll. 5: 355.)

As here defined this includes *Pleurotus* subsections *Clytocybarii* and *Eu-Pleurotus*, of the *Sylloge*. This is an example of a most confusing shifting of names. Our generation is not responsible for the error of completely ignoring the work of S. F. Gray. His work was in the main good and deserves recognition on other grounds besides priority.

44. MICROMPHALE (Nees) S. F. Gray, Nat. Arr. Brit. Pl. 1: 622. 1821.

Sporocarp fleshy, putrescent: pileus more or less irregular: lamellae sinuate or adnexed: spores white: veil none: stipe more or less eccentric, stout, solid.

Type, *Pleurotus fimbriatus* (Bolt.). (Syll. 5: 344.)

This is *Pleurotus*, subsection *Tricholomatarii*, of the *Sylloge*. It is a sufficiently well-marked genus of which *Pleurotus ulmarius* (Bull.) is the best known North American species.

45. COPRINOPSIS Karst. Acta Soc. Faun. Fl. Fenn. 2: 26. 1881.

Ephemorocybe Fayod, Ann. Sci. Nat. Bot. VII. 9: 380

(metonym). 1889. Type *Coprinus ephemerus* (Bull.) Fries. (Syll. 5: 1106.)

Putrescent: pileus membranous, deeply sulcate-plicate from splitting along the backs of the lamellae: lamellae free, adnexed or adnate, deliquescent at maturity: spores black or brownish-black: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *Coprinus Friesii* Quél. (Syll. 5: 1106.)

This is *Coprinus* tribe *Veliformes*, of the *Sylloge*. The other segregates of *Coprinus* must be sought in the series *Cryptophylli*.

46. PSATHYRELLA (Fries) Quél. Champ. Jura Vosg. 122. 1872.

Putrescent: pileus thin, membranous, the margin appressed to the stipe when young, not incurved: lamellae adnexed or adnate, persistent, non-deliquescent: spores black: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *P. gracilis* (Fries) Quél. (Syll. 5: 1127.)

This is taken in the same sense as in the *Sylloge*. It differs from *Coprinopsis* in the non-deliquescent lamellae which do not split along the back. The species assigned to the neighboring genus *Paneolus*, of the *Sylloge*, must be sought under *Campanularius* in the *Cryptophylli*. If there are any of these that are really destitute of a veil they are not provided for in this classification.

47. ASTYLOSPORA Fayod, Ann. Sci. Nat. Bot. VII. 9: 376. 1889.

Psathyra (Fries) Quél. 1872. Not *Psathyra* Spreng. 1818. Not *Psathura* Commers. 1789.

Pluteopsis Fayod, Ann. Sci. Nat. Bot. VII. 9: 377. 1889. Type, *Agaricus hellospermus* Bull. = *Psathyra corrugis* (Pers.). (Syll. 5: 1061.) (metonym.)

Putrescent: pileus thin, submembranous, the margin appressed when young, not incurved: lamellae adnexed or adnate: spores purplish-brown or dark fuscous: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *Psathyra corrugis* (Pers.). (Syll. 5: 1061.)

This is *Psathyra* in the *Sylloge*. It is quite possible that Fayod's separation should be recognized, but it seems unwise to attempt segregations until the structure of our American species is better known. *Pannucia* Karst. is probably a good genus, but no American species have been reported.

48. DECONICA (W. G. Sm.) Sacc. Syll. Fung. 5: 1058. 1887.

Agaricus § *Deconica* W. G. Sm. Jour. Bot. 8: 1870.

Putrescent: pileus fleshy, the margin at first incurved: lamellae decurrent: spores purplish-brown or dark fuscous: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *D. coprophila* (Bull.) Sacc. *loc. cit.*

Used in the same sense as in the *Sylloge* except that the species with a veil must be sought under *Velifrons* in the *Cryptophylli*.

49. PSILOCYBE (Fries) Quél. Champ. Jura Vosg. 116. 1872.

Putrescent: pileus thin but fleshy, the margin at first incurved: lamellae adnexed or adnate: spores purplish-brown or dark fuscous: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *P. cernua* (Vahl.) Quél. (Syll. 5: 1053.)

Taken in the same sense as in the *Sylloge*.

50. MYCENA (Pers.) Roussel, Fl. Calvados ed. 2. 64. 1806.

Bolbitius Fries, Epicr. Myc. 253 (metonym). 1838. Type, *B. vitellinus* (Pers.) Fries. (Syll. 5: 1074.)

Putrescent: pileus fleshy or submembranous: lamellae free or attached, deliquescent: spores ochraceous, ferruginous or cinnamon: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *Bolbitius conocephalus* (Bull.) Fries. (Syll. 5: 1075.)

This is a most unfortunate shifting of names. The genus

is taken in the same sense as in the *Sylloge*, but it is an incongruous group, separated from the other ochraceous-spored genera solely by the deliquescent lamellae. This is not a well-marked character, as it is dependent to some extent on weather conditions and it often appears in a less degree in undoubted species of *Galera* and *Pluteolus*.

51. PLUTEOLUS (Fries) Gillet, Champ. Fr. 1: 549. 1876.

Putrescent: pileus fleshy, margin appressed when young, not incurved: lamellae free: spores ochraceous, ferruginous or cinnamon: veil none: stipe central, slender, tubular, the cortex cartilaginous.

Type, *P. reticulatus* (Pers.) Gillet. (Syll. 5: 859.)

This is used as in the *Sylloge*.

52. GALERELLA gen. nov.

Putrescent: pileus thin, the margin at first appressed not incurved, plicate-sulcate, splitting on the back of the lamellae as in *Coprinopsis*: lamellae adnexed or adnate: spores ochraceous or cinnamon: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *Agaricus coprinoides* Peck, Rep. N. Y. State Mus. 26: 54. 1874. (Syll. 5: 867, as *Galera coprinoides*.)

This is segregated from *Galera* on account of the plicate-sulcate pileus which splits on the back of the lamellae towards the margin, as in *Coprinopsis*. It probably includes several North American species.

53. CONOCYBE Fayod, Ann. Sci. Nat. Bot. VII. 9: 357. 1889.

Galera (Fries) Quél. 1872. Not *Galera* Blume. 1825.

Putrescent: pileus thin, conic-campanulate, the margin at first appressed, not incurved: lamellae attached to a conical enlargement at apex or stipe: spores ochraceous or cinnamon: veil none: stipe central, slender, tubular, cortex cartilaginous, the apex conically enlarged.

Type, *Galera tenera* (Bull.). (Syll. 5: 860.)

The genus is here defined to include only the section

Conocephalae of the *Sylloge.* These plants grow in open pastures and manured grass lands.

54. GALERINA gen. nov.

Putrescent: pileus convex or broadly campanulate, the margin at first appressed not incurved: lamellae squarely adnate: spores ochraceous or cinnamon: veil none: stipe central, slender, tubular, cortex cartilaginous, cylindrical, the apex not enlarged.

Type, *Agaricus vittaeformis* Fries, Epicr. Myc. 207. 1838. (Syll. **5**: 867, as *Galera vittiformis.*)

This includes *Galera* § *Bryogenae*, of the *Sylloge.* The plants usually grow among mosses in the woods.

55. TUBARIA (W. G. Sm.) Gillet, Champ. Fr. **1**: 537. 1876.

Putrescent: pileus fleshy, the margin at first inrolled: lamellae decurrent: spores ochraceous, ferruginous or cinnamon: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *T. inquilina* (Fries) Gillet. (Syll. **5**: 876.)

Used as in the *Sylloge*, but a considerable number of the species there referred to this genus have a veil in the young stage and are here referred to *Flammulaster*.

56. NAUCORIA (Fries) Quél. Champ. Jura Vosg. 99. 1872.

Simocybe Karst. Hattsv. 416 (metonym). 1879. Type, *Naucoria lugubris* Fries. (Syll. **5**: 828.)

Putrescent: pileus fleshy, the margin at first inrolled: lamellae adnexed or adnate: spores bright-ochraceous or ferruginous: veil none: stipe central, slender, tubular, with a cartilaginous cortex.

Type, *N. melinoides* (Bull.) Quél. Champ. Jura Vosg. 99. 1872. (Syll. **5**: 836.)

This is equivalent to *Naucoria* § *Gymnotae*, of the *Sylloge*. The species may be distinguished from the following by habitat and general habit as well as by the technical difference in the color of the spores.

57. BULLA Batt. Fung. Hist. 57. 1755.

Agrocybe Fayod, Ann. Sci. Nat. Bot. VII. 9: 358 (metonym). 1889. Type, *Naucoria semiorbicularis* (Bull.). (Syll. 5: 844.)

Putrescent: pileus fleshy, the margin at first inrolled: lamellae at first adnexed or adnate: spores dull colored, fuscous or cinnamon: veil none: stipe central, slender, tubular, with a cartilaginous cortex or somewhat fibrous.

Type, *Naucoria arvalis* (Fries). (Syll. 5: 845.)

This is *Naucoria* § *Phaeotae*, of the *Sylloge*. The type selected, *Bulla platicephala*, is the first identifiable binomial used by the author. La Planche's reference of *Bulla verucunda* to *Collybia extuberans* is clearly an error, since Fries cites Fig. 1 not Fig. A.

58. NOLANEA (Fries) Quél. Champ. Jura Vosg. 89. 1872.

Putrescent: pileus thin, campanulate, margin appressed when young, not incurved: lamellae free or adnexed: spores pink or salmon: veil none: stipe central, slender, tubular, cortex, cartilaginous.

Type, *N. pascua* (Pers.) Quél. (Syll. 5: 716.)

Used as in the *Sylloge*.

59. ECCILIA (Fries) Quél. Champ. Jura Vosg. 90. 1872.

Hyporhodius Schroet. Krypt. Fl. Schles. 3^1: 613 (typonym). 1889.

Putrescent: pileus thin, the margin at first incurved: lamellae decurrent: spores pink or salmon: veil none: stipe central, slender, tubular, cortex cartilaginous.

Type, *E. atrides* (Lasch) Quél. (Syll. 5: 731.)

Used as in the *Sylloge*.

60. LEPTONIELLA gen. nov. (Fries) Quél. Champ. Jura Vosg. 88. 1872. Not *Leptonium* Griffith. 1843.

Putrescent: pileus thin, umbilicate, squamulate, the margin at first incurved: lamellae adnexed or adnate not decurrent: spores pink or salmon: veil none: stipe central, slender, tubular, cortex cartilaginous.

Type, *L. anatina* (Lasch) Quél. (Syll. 5: 707.)
Used as in the *Sylloge*.

61. LEPTOMYCES Mont. Syll. Crypt. 128. 1854.
Hiatula (Fries) Sacc. Syll. 5: 305 (metonym). 1887. Type, *H. Bengonii* (Fries) Sacc. (Syll. 5: 305.)
Leucoprinus Pat. Bull. Soc. Myc. Fr. 4: 26 (metonym). 1888. Type, *Hiatula flaviceps* (Pat.) Sacc. (Syll. 9: 40.)
Putrescent: pileus membranous, plicate-sulcate, the margin splitting on the back of the lamellae, appressed to stipe when young: lamellae free or attached: spores white: veil none: stipe central, slender, tubular, cortex cartilaginous.
Type, *Hiatula lignifragus* Mont. (Syll. 5: 307.)
This takes the place of *Hiatula* of the *Sylloge*. The character of the pileus is the same as in *Coprinopsis* and *Galerella*.

62. DELICATULA Fayod, Ann. Sci. Nat. Bot. VII. 9: 313. 1889.
Putrescent: pileus umbilicate, the margin at first appressed: lamellae decurrent, thick, obtuse, narrow: spores white: veil none: stipe central, slender, tubular, cortex cartilaginous.
Type, *Omphalia integrella* (Pers.). (Syll. 5: 337.)
This is *Omphalia* subsection *Integrellae*, of the *Sylloge*.

63. OMPHALOPSIS gen. nov.
Omphalia (Fries) Quél. 1872. Not *Omphalius* Roussel. 1806. Type, *O. cyanophylla* Fries. (Syll. 5: 329.)
Putrescent: pileus usually umbilicate, the margin at first appressed: lamellae decurrent, thin, broad, acute: spores white: veil none: stipe central, slender, tubular, cortex cartilaginous.
Type, *Agaricus campanella* Fries, Syst. Myc. 1: 166. 1821. (Syll. 5: 327, as *Omphalia Campanella*.)
This is *Omphalia* subsection *Campanellae*, of the *Sylloge*.

64. INSICITICIA gen. nov.
Putrescent: pileus convex, the margin at first appressed: lamellae adnate or adnexed: spores white: veil none: stipe

central, slender, tubular, short, the base deeply inserted in the matrix.

Type, *Agaricus corticola* Fries, Syst. Myc. 1: 159. 1821. (Syll. 5: 302, as *Mycena corticola.*)

This is *Mycena* § *Insititiae*, of the *Sylloge.*

65. BASIDOPUS gen. nov.

Putrescent: pileus convex, the margin at first appressed: lamellae adnate or adnexed: spores white: veil none: stipe central, slender, tubular, cortex cartilaginous, the base dilated in a disc or bulbil.

Type, *Agaricus stylobates* Pers. Syn. Fung. 390. 1801. (Syll. 5: 297, as *Mycena stylobates.*)

This is *Mycena* § *Basipides*, of the *Sylloge.*

66. COLLOPUS gen. nov.

Putrescent: pileus convex, the margin at first appressed: lamellae adnate or adnexed: spores white: veil none: stipe central, slender, tubular, glutinous-viscid.

Type, *Agaricus epipterygius* (Scop.) Fries, Syst. Myc. 1: 155. 1821. (Syll. 5: 294, as *Mycena epipterygia.*)

This is *Mycena* § *Glutinipedes*, of the *Sylloge.*

67. GALACTOPUS gen. nov.

Putrescent: pileus convex, the margin at first appressed: lamellae adnate or adnexed: spores white: veil none: stipe central, tubular, lactiferous, bleeding when cut, as do also the lamellae.

Type, *Agaricus haematopus* Pers. Syn. Fung. 379. 1801. (Syll. 5: 291, as *Mycena haematopoda.*)

This is *Mycena* § *Lactipedes*, of the *Sylloge.*

68. STEREOPODIUM gen. nov.

Putrescent, densely cespitose: pileus convex, the margin at first appressed: lamellae adnate or adnexed: spores white: veil none: stipe central, tubular, tough, radicating.

Type, *Agaricus galericulatus* (Scop.) Fries, Syst. Myc. 1: 143. 1821. (Syll. 5: 268, as *Mycena galericulata.*)

This corresponds to *Mycena* § *Rigidipedes*, of the *Sylloge.*

69. LINOPODIUM gen. nov.

Putrescent, solitary or gregarious: pileus convex, the margin appressed: lamellae adnate or adnexed, white, changing to gray or reddish: spores white: veil none: stipe central, tubular, slender, fragile, radicating.

Type, *Agaricus filopes* (Bull.) Fries, Syst. Myc. 1: 142. 1821. (Syll. 5: 283, as *Mycena filipes.*)

This includes *Mycena* § *Filipedes* and § *Fragilipedes*, of the *Sylloge*.

70. PRUNULUS (Cesalp.) S. F. Gray, Nat. Arr. Brit. Pl. 1: 630. 1821.

Mycenula Karst. Medd. Soc. Faun. Fl. Fenn. **16**: 89 (metonym). 1889. Type, *Mycena pura* (Pers.). (Syll. 5: 256.)

Putrescent, solitary or gregarious: pileus convex, the margin appressed: lamellae adnate or adnexed, color unchanging, usually bright: spores white: veil none: stipe central, tubular, rather firm, not radicating.

Type, *Mycena pelianthina* Fries. (Syll. 5: 251.)

This includes *Mycena* § *Calodontes* and § *Adonidae*, of the *Sylloge*.

71. OMPHALINA Quél. Ench. Fung. 42. 1886.

Putrescent, solitary or gregarious: pileus umbilicate, the margin at first incurved: lamellae decurrent: spores white: veil none: stipe central, tubular, cortex cartilaginous.

Type, *Omphalia hydrogramma* (Fries). (Syll. 5: 309.)

This is here taken to include *Omphalia* § *Collybiariae*, of the *Sylloge*.

72. TEPHROPHANA gen. nov.

Putrescent, solitary or cespitose: pileus convex, hygrophanous, the margin at first incurved: lamellae adnate or adnexed, cinereous: spores white: veil none: stipe central, slender, tubular, cortex cartilaginous.

Type, *Collybia fimicola* Earle, Bull. N. Y. Bot. Gard. 3: 298. 1904.

This is equivalent to *Collybia* § *Tephrophane*, of the *Sylloge*. The distinguishing features are the hygrophanous pileus and cinereous lamellae.

73. COLLYBIDIUM gen. nov.

Putrescent, solitary or cespitose: pileus convex, not hygrophanous, margin at first incurved: lamellae adnate or adnexed, white or bright-tinted: spores white: veil none: stipe central, slender, tubular, cortex cartilaginous, not striate.

Type, *Agaricus velutipes* (Curt.) Fries, Syst. Myc. 1: 119. 1821. (Syll. 5: 212, as *Collybia velutipes*.)

This as here understood is a large genus, including *Collybia* § *Vestipides* and § *Levipides*, of the *Sylloge*. The characters are mostly negative.

74. GYMNOPUS Roussel, Fl. Calvados ed. 2. 62. 1806.

Collybia (Fries) Quél. Champ. Jura Vosg. 56 (metonym). 1872. Type, *C. radicata* (Relh.) Quél. (Syll. 5: 200.)

Lyophyllum Karst. Acta Soc. Faun. Fl. Fenn. 2: 3 (metonym). 1881. Type, *Collybia leucophaeata*, Karst. (Syll. 5: 205.)

Putrescent, solitary or gregarious: pileus convex, not hygrophanous, the margin at first incurved: lamellae adnate or adnexed, white or tinted: spores white: veil none: stipe central, rather stout, tubular or fibrous, sulcate or fibrillose-striate.

Type, *Collybia longipes* (Bull.). (Syll. 5: 202.)

This is *Collybia* § *Striipedes*, of the *Sylloge*. It is distinguished from the previous genus by larger size and stouter, striate stipe.

75. PILOSACE (Fries) Pat. Hymén. Eur. 122. 1887.

Putrescent, solitary or gregarious: pileus fleshy, convex or expanded, discrete from the stipe: lamellae free: spores purplish-brown: veil none: stipe central, stout, fleshy, without a cortex.

Type, *P. algeriensis* (Fries). (Syll. 5: 1011.)

Taken in the same sense as in the *Sylloge*.

76. LEPISTA (Fries) W. G. Sm. Clavis Agar. 26. 1870.

Putrescent, solitary or gregarious: pileus large, fleshy: lamellae easily separable from the pileus, adnexed: spores sordid-white: veil none: stipe central, stout, fleshy, without a cortex.

Type, *Tricholoma nudum* (Bull.). (Syll. 5: 131.)

The species supposed to constitute this genus must be looked for under *Tricholoma* in the *Sylloge*. The validity of the genus and the value of so-called easily separable lamellae as a generic character can only be determined by careful histological studies. At present the status of this genus must be considered as doubtful.

77. PAXILLUS Fries, Gen. Hymen. 8. 1836.

Putrescent, solitary or gregarious: pileus fleshy, often somewhat irregular: lamellae easily separable from the pileus, adnate or decurrent: spores sordid or ochraceous: veil none: stipe central or somewhat eccentric, fleshy, no cortex.

Type, *P. involutus* (Batsch) Fries. (Syll. 5: 987.)

This includes only the central-stemmed or slightly eccentric species of the *Sylloge*. Those that are lateral or resupinate must be sought under *Tapinia* (Fries) Karst.

78. PHYLLOPORUS Quél. Fl. Myc. 409. 1888.

(See Bres. Fung. Trid. 2: 95. 1900, for synonymy.)

Putrescent, solitary: pileus thick, fleshy, convex, tomentose: lamellae concrete with the pileus, long-decurrent, anastomosing at base: spores ochraceous, elongated: stipe central, fleshy, no cortex.

Type, *Gomphidius rhodoxanthus* (Schw.). (Syll. 5: 1139.) This genus is well marked by the tomentose, *Boletus*-like pileus and the elongated, *Gomphidius*-like spores. So far as known it is monotypic.

79. GYMNOCYBE Karst. Hattsv. 412. 1879.

Putrescent, solitary or cespitose: pileus fleshy, dry, often squamulose, not striate: lamellae adnate-decurrent, not anas-

tomosing: spores ferruginous or fusco-ferruginous, elliptical: veil none: stipe central, fleshy or somewhat woody, no cortex.

Type, *Flammula Weinmanni* (Fries). (Syll. **5**: 1144.)

This includes *Flammula* § *Gymnotae*, of the *Sylloge*, but there is reason to suppose that at least many of the tropical species referred to that section really have a well-developed veil in the young state and therefore do not belong here. The genus must be considered as somewhat doubtful.

80. HEBOLOMATIS gen. nov.

Putrescent, solitary or gregarious: pileus fleshy, glabrous, moist or subviscid: lamellae adnexed: spores ochraceous: veil none: stipe central, fleshy, no cortex, whitened above.

Type *Agaricus crustuliniformis* (Bull.) Fries, Epicr. 180. 1838. (Syll. **5**: 799, as *Hebeloma crustuliforme.*)

This is *Hebeloma* § *Denudiata*, of the *Sylloge*.

81. ORCELLA Batt. Fung. Hist. 74. 1755.

Pleuropus Roussel, Fl. Calvados ed. 2. 67 (typonym). 1806.

Clitopilus (Fries) Quél. Champ. Jura Vosg. 87 (metonym). 1872. Type, *Clitopilus prunulus* (Scop.) Quél. (Syll. **5**: 699.)

Rhodosporus Schroet. Krypt. Fl. Schles. 3^1: 617 (metonym). 1889. Type, *Clitopilus prunulus* (Scop.) Quél. (Syll. **5**: 699.)

Hexajuga Fayod, Ann. Sci. Nat. Bot. VII. **9**: 389 (typonym). 1889.

Putrescent, solitary or gregarious: pileus fleshy: lamellae decurrent: spores pink or salmon: veil none: stipe central, stout, fleshy or fibrous, no cortex.

Type, *Clitopilus Orcella* (Bull.). (Syll. **5**: 699.)

This is *Clitopilus* of the *Sylloge*. There are, however, at least two earlier names.

82. ENTOLOMA (Fries) Quél. Champ. Jura Vosg. 83. 1872.

Rhodophyllus Quél. Ench. Fung. 57 (typonym). 1886.

Putrescent, solitary or gregarious: pileus fleshy: lamellae sinuate or adnexed: spores pink or salmon: veil none: stipe central, stout, fleshy or fibrous, no cortex.

Type, *E. lividum* (Bull.) Quél. (Syll. 5: 680.)

This is used in the same sense as in the *Sylloge.*

83. PLUTEUS Fries, Gen. Hymen. 6. 1836.

Putrescent, solitary or gregarious: pileus fleshy, discrete from the stipe: lamellae free: spores pink or salmon: veil none: stipe central, stout, fleshy or fibrous, no cortex.

Type, *P. cervinus* (Schaeff.) Fries. (Syll. 5: 665.)

Used in the same sense as in the *Sylloge.*

84. CAMAROPHYLLUS (Fries) Karst. Hattsv. 224. 1879.

Putrescent, scattered or gregarious: pileus fleshy, firm, moist but not viscid: lamellae waxy, distant, broad, firm, decurrent or adnexed: spores white: veil none: stipe central, fleshy, no cortex.

Type, *Hygrophorus caprinus* (Scop.) Fries. (Syll. 5: 399.)

This is *Hygrophorus* § *Camarophyllus*, of the *Sylloge.*

85. HYDROPHORUS Batt. Fung. Hist. 51. 1755.

Hydrocybe (Fries) Karst. Hattsv. 233 (metonym). 1879. Type, *Hygrophorus scropanus* Fries. (Syll. 5: 410.) (Not *Hydrocybe* Peck. 1887.)

Hygrocybe Fayod, Ann. Sci. Nat. Bot. VII. 9: 307 (typonym). 1889.

Godfrinia Maire, Rech. Cyt. Tax. 116 (metonym). 1902. Type, *Hygrophorus conicus* (Scop.) Fries. (Syll. 5: 418.)

Putrescent, solitary or gregarious: pileus fleshy but thin and fragile, viscid: lamellae waxy, fragile, often bright colored, decurrent or adnexed: spores white: veil none: stipe central, fragile, hollow, no cortex.

Type, *Hygrophorus coccineus* (Schaeff.) Fries. (Syll. 5: 412.)

This is *Hygrophorus* § *Hygrocybe*, of the *Sylloge.*

86. MONODELPHUS gen. nov.

Putrescent, cespitose: pileus fleshy with thin margin, at first umbonate: lamellae unequally decurrent, not waxy: spores white: veil none: stipe central or nearly so, usually fibrous, no cortex.

Type, *Agaricus illudens* Schw. Schr. Nat. Ges. Leipzig 1: 81. 1822. (Syll. 5: 162, as *Clitocybe illudens.*)

This is taken to equal *Clitocybe* § *Difformes*, of the *Sylloge*. It is a well-marked genus closely related to *Crepidotus* S. F. Gray and *Lentinellus* Karst., but having little in common with the groups with which it has usually been associated.

87. OMPHALIUS Roussel, Fl. Calvados ed. 2. 66. 1806.

Putrescent, solitary or gregarious: pileus thin, infundibuliform: lamellae long-decurrent: spores white: veil none: stipe central, fleshy or fibrous, no cortex.

Type, *Clitocybe cyathiformis* (Fries). (Syll. 5: 176.)

This includes *Clitocybe* § *Infundibuliformes* and § *Cyathiformes*, of the *Sylloge*. It is comparable with *Pocillaria*, but the texture is softer and there is less vestiture. It is not to be confounded with *Omphalia* (Fries) Quél. 1872. The name is perhaps too nearly the same as *Omphalea* L.

88. CLITOCYBE (Fries) Quél. Champ. Jura Vosg. 48. 1872.

Putrescent, solitary or gregarious: pileus fleshy, usually convex: lamellae adnate or short-decurrent: spores white, elliptical, smooth: veil none: stipe central, fleshy, no cortex.

Type, *C. nebularis* (Batsch) Quél. (Syll. 5: 142.)

This is *Clitocybe* § *Disciformes*, of the *Sylloge*. It differs from *Omphalius* in the thick, fleshy, usually convex pileus and in the short-decurrent gills. Some species of sections *Orbiformes* and *Versiformes* are also included here.

89. LACCARIA Berk. & Br. Ann. Nat. Hist. 370. 1883.

Putrescent, solitary or gregarious: pileus thin, fleshy, convex or depressed, hygrophanous, often somewhat irregular: lamellae short-decurrent, thick, conspicuously whitened by

the spores: spores white, globose, echinulate: stipe central or nearly so, fleshy or fibrous, no cortex.

Type, *Clitocybe laccatus* (Scop.). (Syll. 5: 197.)

This is *Clitocybe* § *Versiformes*, subsection *Laccaria*, of the *Sylloge*. It is a well-marked group having little in common with the other sections of the Saccardian *Clitocybe*.

90. MELANOLEUCA Pat. Tax. Hymén. 157. 1900.

Melaleuca Pat. 1887. Not *Melaleuca* L. 1767.

Putrescent, solitary or gregarious: pileus fleshy but usually thin, moist, usually hygrophanous: lamellae sinuate or adnexed: spores white: veil none: stipe central, stout, fleshy, no cortex.

Type, *Tricholoma melaleucum* (Pers.). (Syll. 5: 134.)

This is here taken to include the sections *Guttatae*, *Spongiosa* and *Hygrophana*, of the genus *Tricholoma*, of the *Sylloge*.

91. GLUTINASTER gen. nov.

Tricholoma (Fries) Quél. 1872. *p.p.* Type, *T. collossus* (Fries) Quél. (Syll. 5: 91.) Not *Tricholoma* Benth. 1820.

Putrescent, solitary or gregarious: pileus thick, fleshy, viscid: lamellae sinuate or adnexed: spores white: veil none: stipe central, stout, fleshy, no cortex.

Type, *Agaricus equestris* Fries, Ench. Fung. 1: 6. 1828. (Syll. 5: 87, as *Tricholoma equestre*.)

As here defined this includes only the § *Limacina* of the *Sylloge*. It constitutes a well-defined, clearly recognizable generic group, probably representing the highest development of the *Gymnophylli*.

§ 2. *Cryptophylli*

Lamellae when young covered by a veil or a cortina or by both.

92. TECTELLA gen. nov.

Persistent, reviving, fasciculate: pileus resupinate, poculate: lamellae concentric from a central point: spores white: veil covering the young lamellae, soon vanishing: stipe none.

Type, *Panus operculatus* B. & C. Ann. Mag. Nat. Hist. 1859. (Syll. 5: 629.)

So far as known this genus is monotypic.

93. LENTODIUM Morgan, Jour. Cinc. Soc. Nat. Hist. 18: 36. 1895.

Persistent, reviving, solitary or cespitose: pileus tough, squamose, usually convex: lamellae decurrent or adnate: spores white: veil poorly developed, often evanescent, not forming a distinct annulus: stipe central, hard, woody.

Type, *Lentinus tigrinus* (Bull.) Fries. (Syll. 5: 580).

This is *Lentinus* § *Lepidei*, of the *Sylloge*. This generic name is selected with some hesitation, as it was first applied to an abnormality, but there is none other available. The annulate species of *Marasmius* form a valid genus which should be placed here, but none of them have been reported from our limits.

94. CAMPANULARIUS Roussel, Fl. Calvados ed. 2. 64. 1806.

Chalymota Karst. Hattsv. 518 (metonym). 1879. Type, *Panaeolus Phalenarum* (Fries). (Syll. 5: 1119.)

Putrescent, solitary or gregarious: pileus campanulate or convex, margin at first incurved: lamellae adnate or adnexed, not deliquescent: spores black: veil slight, usually soon evanescent, not forming a persistent annulus; stipe central, slender, tubular, cortex cartilaginous.

Type, *Panaeolus campanulatus* (L.). (Syll. 5: 1121.)

This is the genus *Panaeolus* of the *Sylloge* (1887), but not of Quélet, 1872.

95. DELITESCOR gen. nov.

Putrescent, solitary or gregarious: pileus convex, glabrous: lamellae subdecurrent, broad: spores purplish-brown or dark fuscous: veil manifest when young, soon vanishing from pileus but usually persisting as a fibrillose coating on the stipe: stipe central, tubular, cortex cartilaginous.

Type, *Agaricus bullaceus* (Bull.) Fries, Syst. Myc. 1: 297. 1821. (Syll. 5: 1058, as *Deconica bullacea*.)

It is probable that other species now referred to *Deconica* have a veil and should go here.

96. GALERULA Karst. Hattsv. 442. 1879.

Putrescent, solitary or gregarious: pileus thin, convex, margin at first appressed: lamellae adnate or adnexed: spores ochraceous or cinnamon: veil slight, soon evanescent, not forming an annulus: stipe central, slender, tubular, cortex cartilaginous.

Type, *Galera pityria* (Fries). (Syll. 5: 871.)

This is *Galera* § *Eriodermae*, of the *Sylloge.*

97. FLAMMULASTER gen. nov.

Putrescent, solitary or gregarious: pileus convex, squamose or silky, the margin at first incurved: lamellae adnexed, adnate, or decurrent: spores ferruginous or cinnamon: veil slight, subevanescent, not forming a distinct annulus: stipe central, slender, tubular, cortex cartilaginous.

Type, *Agaricus carpophilus* Fries, Obs. Myc. 1: 45. 1815. (Syll. 5: 857, as *Naucoria carpophila.*)

This is *Naucoria* § *Lepidotae*, of the *Sylloge*, and it also includes a considerable number of species that are there placed in *Tubaria.*

98. COPRINELLUS Karst. Hattsv. 542. 1879.

Lentispora Fayod, Ann. Sci. Nat. Bot. VII. 9: 379 (metonym). 1889. Type, *Coprinus tomentosus* (Bull.) Fries. (Syll. 5: 1088.)

Putrescent, solitary or gregarious: pileus thin, fleshy or submembranous: lamellae deliquescent: spores black: veil usually well developed and remaining as a vestiture on the pileus, but not forming an annulus: stipe central, fleshy, but usually slender and fragile, often hollow.

Type, *Coprinus deliquescens* (Bull.) Fries. (Syll. 5: 1094.)

For the present I include here *Coprinus* § *Picacei*, § *Tomentosi*, § *Micacei* and § *Glabrati*, of the *Sylloge*. It forms a large and rather incongruous group that will probably be subjected to further segregation.

99. GOMPHIDIUS Fries, Gen. Hymen 8. 1836.

Putrescent, solitary or gregarious: pileus convex, thick, fleshy, viscid: lamellae decurrent, waxy: spores black, elongated: veil glutinous or submembranous: stipe central, stout, fleshy, without a cortex sometimes subannulate.

Type, *G. glutinosus* (Schaeff.) Fries. (Syll. **5**: 1137.)

This is used in the same sense as in the *Sylloge*. It is a striking and well-marked genus.

100. HYPHOLOMOPSIS nom. nov. Clements, Bot. Surv. Neb. **4**: 23. 1896. Not *Gymnochilus* Blume. 1858.

Putrescent, solitary or cespitose: pileus fleshy but thin and fragile, hygrophanous: lamellae adnate or adnexed: spores purplish-brown or dark fuscous: veil slight and evanescent or conspicuous and appendiculate, not forming an annulus: stipe central, fleshy, hollow, usually slender and fragile.

Type, *Hypholoma appendiculatum* (Bull.). (Syll. **5**: 1039.)

This is *Hypholoma* § *Appendicularia*, of the *Sylloge*. *Gymnochilus* was proposed by Blume as a substitute for *Psathyra*, but the author specifically based it on the subgenus *Psathyra* of Fries's *Systema Mycologicum*. Fries's type, so far as it can now be determined, was what is called *Hypholoma appendiculatum* Bull., in the *Sylloge*, which falls within the limits of this genus, although the author of *Gymnochilus* had no intention that it should be so used.

101. DRYOSOPHILA Quél. Ench. Fung. 115. 1886.

Lachrymaria Pat. Hymén. Eur. 122 (metonym). 1887. Type, *Hypholoma lacrymabundum* (Fries). (Syll. **5**: 1033.)

Cortinopsis Schroet. Krypt. Fl. Schles. 3^1: 566 (typonym). 1889. Type, *Hypholoma lacrymabundum* (Fries). (Syll. **5**: 1033.)

Glyptosperma Fayod, Ann. Sci. Nat. Bot. VII. **9**: 377 (metonym). 1889. Type, *Hypholoma velutinum* (Pers.). (Syll. **5**: 1034.)

Putrescent, solitary or cespitose: pileus fleshy, thin, rather firm, viscid or squamulose, not hygrophanous: lamellae

adnate or adnexed: spores purplish-brown or dark fuscous: veil fairly well developed, appendiculate, not forming an annulus: stipe central, fleshy or fibrous, rather firm.

Type, *Hypholoma cascum* (Fries). (Syll. 5: 1036.)

This includes *Hypholoma* § *Viscidae*, § *Flocculosae* and § *Velutinae*, of the *Sylloge*. This arrangement is tentative; further segregation will doubtless be needed.

102. HYPHOLOMA (Fries) Quél. Champ. Jura Vosg. 112. 1872.

Naematoloma Karst. Hattsv. 495 (typonym). 1879.

Putrescent, densely cespitose: pileus fleshy, firm, dry, glabrous: lamellae adnate or adnexed: spores purplish-brown or dark fuscous: veil fairly well developed, appendiculate, not forming an annulus: stipe central or nearly so, fibrous, firm, usually solid.

Type, *H. sublateritium* (Schaeff.) Quél. (Syll. 5: 1028.)

This is *Hypholoma* § *Fascicularia*, of the *Sylloge*.

103. RYSSOSPORA Fayod, Ann. Sci. Nat. Bot. VII. 9: 361. 1889.

Putrescent, solitary or cespitose: pileus fleshy, thin, hygrophanous: lamellae adnate or decurrent: spores ochraceous or cinnamon: cortina none: veil usually slight and vanishing but sometimes leaving an indistinct annular mark: stipe central, fleshy or fibrous, firm.

Type, *Flammula apicrea* (Fries). (Syll. 5: 821.)

This is *Flammula* § *Udae*, of the *Sylloge*.

104. VISCULUS gen. nov.

Flammula (Fries) Quél. 1872. Not *Flammula* DC. 1818.

Putrescent, solitary or cespitose: pileus fleshy, firm, viscid or glutinous: lamellae adnate or decurrent: spores cinnamon: cortina none: veil poorly developed, evanescent, not forming an annulus: stipe central, fleshy or fibrous, firm.

Type, *Agaricus gummosus* Fries, Monogr. Hymen. Suec. 1: 354. (Syll. 5: 817, as *Flammula gummosa*.)

This is *Flammula* § *Lubricae*, of the *Sylloge*.

105. RIPARTITES Karst. Hattsv. 477. 1879.

Putrescent, solitary or gregarious: pileus thin, fleshy, viscid: lamellae adnexed or sinuate: spores ochraceous or cinnamon: cortina none: veil slight, soon evanescent: stipe central, slender, fibrous, apex not whitened.

Type, *Inocybe tricholoma* (Alb. & Schw.). (Syll. 5: 790.)

This is *Inocybe* § *Viscidae*, of the *Sylloge*. It may be distinguished from the next genus by the smaller average size and the slender, fibrous stipe.

106. PICROMYCES Batt. Fung. Hist. 47. 1755.

Hebeloma (Fries) Quél. Champ. Jura Vosg. 334 (metonym). 1872. Type, *H. mesophaeum* (Pers.) Quél. (Syll. 5: 795.)

Roumegueria Karst. Hattsv. 452. 1879. Type, *Hebeloma struphosum* Fries (metonym).

Hylophila Quél. Ench. Fung. 98 (metonym). 1886. Type, *Hebeloma sinuosum* (Bull.) Quél. (Syll. 5: 792.)

Putrescent, solitary or gregarious: pileus fleshy, usually thick, subviscid: lamellae sinuate or adnexed: spores ochraceous: cortina none: veil very slight and soon evanescent: stipe central, stout, fleshy, whitened at apex.

Type, *Hebeloma fastibile* (Fries) Quél. (Syll. 5: 792.)

This is *Hebeloma* § *Indusiata*, of the *Sylloge*. It is very closely related to *Hebelomatis* in the *Gymnophylli*. The two series seem to approach each other here more closely than at any other one point.

107. GYMNOPHILUS Karst. Hattsv. 400. 1879.

Putrescent, solitary or cespitose: pileus fleshy, dry, squamose or silky: lamellae adnate or decurrent: spores ferruginous: cortina none: veil manifest, at length evanescent: stipe central or nearly so, firm, fleshy or often woody.

Type, *Flammula Liquiritiae* (Pers.). (Syll. 5: 825.)

This is *Flammula* § *Sapineae* and § *Sericellae*, of the *Sylloge*. A number of the species placed in § *Gymnotae* also belong here, since they have a well-developed veil when young.

108. ASTROSPORINA Schroet. Krypt. Fl. Schles. 3^1: 576. 1889.

Putrescent, solitary or gregarious: pileus thin, dry, silky, smooth, not rimose: lamellae adnexed: spores ochraceous or cinnamon, often rough or angular: cortina none: veil slight, soon evanescent: stipe central, slender, fibrous, glabrous.

Type *Inocybe scabella* (Fries). (Syll. 5: 787.)

This is *Inocybe* § *Velutinae*, of the *Sylloge*. It runs very close to the next genus. In some cases it is difficult to say whether the covering of the young lamellae should be considered as a veil or a cortina.

109. AGMOCYBE gen. nov.

Clypeus (Britz.) Fayod. 1889. Not *Clypea* Blume. 1825. Type, *Inocybe asterospora* Sucht. (Syll. 5: 780.)

Putrescent, solitary or gregarious: pileus thin, dry, silky, the pellicle at length radiately rimose: lamellae adnexed: spores ochraceous or cinnamon, often rough or angular; cortina none: veil slight, soon evanescent: stipe central, slender, fibrous, whitened, slightly fibrillose.

Type, *Agaricus rimosus* (Bull.) Fries, Syst. Myc. 1: 258. 1821. (Syll. 5: 775, as *Inocybe vinosa*.)

This is *Inocybe* § *Rimosae*, of the *Sylloge*. It tends to intergrade with both the preceding and the following genera and yet the group as a whole is easily distinguished by the rimose surface of the pileus. The peculiar character of the spores often furnishes excellent specific characters in this and allied genera, but these peculiarities do not seem to be correlated with other characteristics and so do not serve for generic distinctions.

110. INOCIBIUM gen. nov.

Putrescent, solitary or gregarious: pileus thin, dry, the pellicle splitting into lacerate or imbricate, appressed scales: lamellae adnexed: spores ochraceous or cinnamon, often rough or angular: cortina none: veil slight, evanescent: stipe central, slender, fibrous, subconcolorous, fibrillose.

Type, *Agaricus lacerus* Fries, Syst. Myc. 1: 257. 1821. (Syll. 5: 767, as *Inocybe lacera.*)

This is *Inocybe* § *Lacerae*, of the *Sylloge.*

111. INOCYBE (Fries) Quél. Champ. Jura Vosg. 151. 1872.

Putrescent, solitary or gregarious: pileus thin, squarrose-squamose: lamellae adnexed: spores ochraceous or cinnamon, often roughened or angular: cortina none: veil slight, evanescent: stipe central, slender, fibrous, concolorous, squamose.

Type, *I. relicina* (Fries) Quél. (Syll. 5: 764.)

This is *Inocybe* § *Squarrosae*, of the *Sylloge.*

112. HYDROCYBIUM gen. nov.

Gomphos O. Kuntze, Rev. Gen. 2: 853. 1891. Type, *Cortinarius castaneus* Fries. (Syll. 5: 971.) Not *Gomphos* Batt. 1775. Not *Gomphus* Pers. 1800.

Putrescent, solitary or gregarious: pileus thin, fleshy, moist, hygrophanous: lamellae adnate or adnexed: spores cinnamon: cortina of thin cobweb-like threads, soon evanescent: veil none or very slight; stipe central, slender, firm, glabrous, not peronate.

Type, *Hydrocybe praepallens* Peck, Bull. N. Y. State Mus. 1^2: 9. 1887. (Syll. 9: 134, as *Cortinarius praepallens.*)

This is *Cortinarius* § *Hydrocybe*, of the *Sylloge.* The group has several times been given generic rank but so far no tenable name seems to have been proposed for it.

113. DERMOCYBE (Fries) Peck, Bull. N. Y. State Mus. 2: 8. 1887.

Putrescent, solitary or gregarious; pileus thin, fleshy, dry, at first fibrillose: lamellae adnate or adnexed: spores cinnamon: cortina of thin cobweb-like threads: veil poorly developed: stipe central, slender, cylindrical, firm, hollow or stuffed, glabrate, not peronate.

Type, *Cortinarius simulans* (Peck) Sacc. (Syll. 9: 129.)

This is *Cortinarius* § *Dermocybe*, of the *Sylloge.* It is

distinguished from the following genus mainly by its smaller size, thinner pileus, and slender stem.

114. INOLOMA (Fries) Karst. Medd. Soc. Faun. Fl. Fenn. **18**: 70. 1891.

Putrescent, solitary: pileus thick, fleshy, dry, at first fibrilose or squamose: lamellae adnate or adnexed: spores cinnamon: cortina of cobweb-like threads, fugacious: veil none or slight: stipe central, stout, fleshy, enlarged below, not peronate.

Type, *Cortinarius opimus* Fries. (Syll. **5**: 923.)

This is *Cortinarius* § *Inoloma*, of the *Sylloge*.

115. PHLEGMACIUM (Fries) Fayod, Ann. Sci. Nat. Bot. VII. **9**: 375. 1889.

Putrescent, solitary: pileus fleshy, usually thick, viscid: lamellae adnate or adnexed: spores cinnamon: cortina of cobweb-like threads, fugacious, attached above the middle of the stipe: veil none: stipe central, stout, somewhat elongated, fleshy, glabrous, dry.

Type, *Cortinarius saginus* Fries. (Syll. **5**: 895.)

This includes *Cortinarius* § *Phlegmacium*, subsections *Cliduchi* and *Elastici*, of the *Sylloge*. To select the type it is necessary to go back to Fries, *Systema Mycologicum*, on which Fayod states that he bases the genus. He states that he knows 36 species that belong here, but he only mentions a few that he does not consider typical.

116. BULBOPODIUM gen. nov.

Putrescent, solitary: pileus thick, fleshy, viscid: lamellae adnate or adnexed: spores cinnamon: cortina of cobweb-like threads, attached to the bulbous base of the stipe: veil none: stipe central, short, stout, bulbous.

Type, *Cortinarius caerulescens* Fries, Epicr. 265. 1838. (Syll. **5**: 902.)

This is *Cortinarius* § *Phlegmacium*, subsection *Scauri*, of the *Sylloge*. It is one of the most clearly defined generic groups in the family.

117. SPHAEROTRACHYS Fayod, Ann. Sci. Nat. Bot. VII. 9: 374. 1889.

1 *Myxacium* (Fries) Peck. 1887. Not *Myxacium* Lév. 1849.

Putrescent, solitary or gregarious: pileus thick, fleshy, viscid: lamellae adnate or adnexed: spores cinnamon: cortina of cobweb-like threads: veil viscid or glutinous: stipe central, stout, viscid-peronate.

Type, *Cortinarius liquidus* Fries. (Syll. 5: 919.)

This is *Cortinarius* § *Myxacium*, of the *Sylloge*. *Sphaerotrachys* was founded to include certain species with rough, globose spores.

118. CORTINARIUS (Pers.) Roussel, Fl. Calvados ed. 2. 61. 1806.

Telamonia (Fries) Peck, Bull. N. Y. State Mus. 2: 8 (metonym). 1887. Type, *Cortinarius gracilis* (Peck) Sacc. (Syll. 9: 133.)

Putrescent, solitary or gregarious: pileus fleshy, usually hygrophanous: lamellae adnate or adnexed: spores cinnamon: cortina arachnoid, often subpersistent: veil fibrillose, conspicuous: stipe central, usually stout and elongated, peronate.

Type, *C. armillatus* (Alb. & Schw.) Fries. (Syll. 5: 952.)

This is *Cortinarius* § *Telamonia*, of the *Sylloge*. It is well marked by the persistent fibrillose veil which forms a white peronate coating on the stipe.

119. MONOMYCES Batt. Fung. Hist. 41. 1755.

Cortinellus (Roze) Karst. Hattsv. 24 (metonym). 1879. Type, *Tricholoma rutilans* (Schaeff.). (Syll. 5: 96.)

Putrescent, solitary or gregarious: pileus thick, fleshy, dry, fibrillose or squamulose: lamellae sinuate or adnexed: spores white: cortina if present arachnoid: veil remaining as a vestiture on the pileus: stipe central, stout, fleshy.

Type, *Tricholoma sculpturatum* (Fries). (Syll. 5: 100.)

This is *Tricholoma* § *Genuina*, § *Rigida* and § *Sericella*,

of the *Sylloge*. It is a large group that will probably require further segregation.

120. HYGROPHORUS Fries, Gen. Hymen. 8. 1836.

Lymacium (Fries) Schroet. Krypt. Fl. Schles. 3^1: 330. 1889. Type, *Hygrophorus eburneus* (Bull.) Fries. (Syll. 5: 388.) Not *Limacia* Tour. 1790.

Putrescent, solitary or gregarious: pileus fleshy, viscid: lamellae adnate or decurrent, waxy: spores white: veil glutinous: stipe central, fleshy, sometimes subannulate.

Type, *H. chrysodon* (Batsch) Fries. (Syll. 5: 387.)

This is *Hygrophorus* § *Limacium*, of the *Sylloge*.

121. ANNULARIUS Roussel, Fl. Calvados ed. 2. 61. 1806.

Putrescent, solitary or gregarious: pileus thin, membranous: lamellae free or attached, deliquescent: spores black: veil persisting as a vestiture on the pileus and forming an annulus: stipe central, slender, tubular, cortex cartilaginous.

Type, *Coprinus ephemeroides* (Bull.) Fries. (Syll. 5: 1096.)

This is *Coprinus* § *Veliformes*, subsection *Cyclodei*, of the *Sylloge*. It is not to be confounded with *Annularia* Schultz.

122. PANAEOLUS (Fries) Quél. Champ. Jura Vosg. 121. 1872.

Anellaria Karst. Hattsv. 517 (metonym). 1879. Type, *A. separata* (L.) Karst. (Syll. 5: 1125.)

Putrescent, solitary or gregarious: pileus thin, fleshy, the margin at first incurved: lamellae adnexed: spores black: veil persistent, forming a more or less distinct annulus: stipe central, slender, tubular, cortex cartilaginous.

Type, *Anellaria fimiputris* (Bull.) Karst. (Syll. 5: 1126.)

This is *Anellaria* of the *Sylloge*, and furnishes another example of the unfortunate shifting of generic names, that will in future be avoided by recognizing genuine types.

123. PHOLIDOTOPSIS gen. nov.

Putrescent, solitary or gregarious: pileus thin, hygroph-

anous: lamellae adnate: spores ochraceous or cinnamon: veil persistent, forming an annulus: stipe central, tubular, cortex cartilaginous.

Type, *Agaricus mycenoides* Fries, Syst. Myc. 1: 246. 1821. (Syll. 5: 760, as *Pholiota mycenoides.*)

This is *Pholiota* § *Muscigenae*, of the *Sylloge*.

124. COPRINUS Pers. Tent. Disp. Fung. 62. 1797.

Onchopus Karst. Hattsv. 526 (metonym). 1879. Type, *Coprinus clavatus* (Batt.) Fries. (Syll. 5: 1080.)

Pselliophora Karst. Hattsv. 528 (typonym). 1879.

Putrescent, solitary or gregarious: pileus fleshy, usually campanulate: veil persistent, forming an annulus: stipe central, fleshy, fragile, no cortex.

Type, *Coprinus comatus* (Muell.) Fries. (Syll. 5: 1079.)

This is *Coprinus* § *Comati* and § *Atramentarii*, of the *Sylloge*.

125. STROPHARIA (Fries) Quél. Champ. Jura Vosg. 110. 1872.

Geophila Quél. Ench. Fung. 111 (metonym). 1886. Type, *Stropharia depilata* (Pers.). (Syll. 5: 1012.)

Putrescent, solitary or gregarious: pileus fleshy: lamellae adnate or adnexed: spores purplish-brown or dark fuscous: veil well developed, forming a persistent annulus: stipe central, stout, fleshy, no cortex.

Type, *S. aeruginosa* (Curt.) Quél. (Syll. 5: 1013.)

Used in the same sense as in the *Sylloge*. It includes two quite diverse groups of species, but it seems difficult to find a technical character by which to distinguish them.

126. AGARICUS L. Sp. Plant. 1171. 1753.

Pratella (Pers.) S. F. Gray, Nat. Arr. Brit. Pl. 1: 626 (metonym). 1821. Type, *Agaricus arvensis* Schaeff. (Syll. 5: 994.)

Psalliota (Fries) Quél. Champ. Jura Vosg. 107 (metonym). 1872. Type, *Agaricus cretaceus* Fries. (Syll. 5: 995.)

Putrescent, solitary or gregarious: pileus fleshy, discrete

from the stipe: lamellae free: spores purplish-brown: veil thick, well developed, forming a persistent annulus: stipe central, stout, fleshy, no cortex.

Type, *Agaricus campestris* L. (Syll. 5: 997.)

This is *Agaricus* of the *Sylloge* and *Psalliota* of many recent writers.

127. PHOLIOTINA Fayod, Ann. Sci. Nat. Bot. VII. 9: 359. 1889.

Putrescent, solitary or gregarious: pileus fleshy, hygrophanous, glabrous or squamulose: lamellae adnate or adnexed: spores cinnamon: veil well developed, forming an annulus: stipe central, fleshy or fibrous, no cortex.

Type, *Pholiota blattaria* (Fries). (Syll. 5: 738.)

This is taken to include all the hygrophanous species of *Pholiota* in the *Sylloge*. The species are there badly classified and some of them will be found in different sections.

128. PHOLIOTA (Fries) Quél. Champ. Jura Vosg. 91. 1872.

Putrescent, solitary or cespitose: pileus fleshy, dry, usually squamose: lamellae adnate or adnexed: spores ferruginous or cinnamon: veil well developed, forming an annulus: stipe central, fleshy or fibrous, firm, glabrous or fibrillose.

Type, *P. dura* (Bolt.) Quél. (Syll. 5: 738.)

This comprises the greater part of *Pholiota* § *Humigenae*, and subsection *Aegeritinae*, of the *Truncigenae*, of the *Sylloge*. Some authors would consider it necessary to replace this name on account of *Pholidota* Lindl. 1825.

129. HYPODENDRUM Paulet, Ic. 75. 1793.

Myxocybe Fayod, Ann. Sci. Nat. Bot. VII. 9: 361 (metonym). 1889. Type, *Pholiota radicosa* (Bull.). (Syll. 5: 741.)

Putrescent, usually cespitose: pileus firm, fleshy, naked or densely squamose: lamellae adnate or adnexed: spores furruginous or fuscous: veil strongly developed, forming an

annulus: stipe central, stout, firm, fleshy or woody, densely squarrous-squamose below the annulus.

Type, *Pholiota squarrosa* (Muell.). (Syll. 5: 749.)

Most of these species may be found in the *Sylloge* under *Pholiota* subsection *Squamosae*. They are probably all lignatile and are mostly densely cespitose.

130. CHAMAEOTA (W. G. Sm.) gen. nov.

Agaricus § *Chamaeota* W. G. Sm. Clav. Agar. 15. 1870.

Annularia Schultz. 1868. Not *Annularius* Roussel. 1806.

Putrescent, solitary or gregarious: pileus fleshy, discrete from the stipe: lamellae free: spores pink or salmon: veil persistent, forming an annulus: stipe central, fleshy, no cortex.

Type, *Agaricus xanthogrammus* Cesati, Comm. Critt. Ital. 1: 58. 1861. (Syll. 5: 664, as *Annularia xanthogramma*.)

This is *Annularia* of the *Sylloge*, but that name is preoccupied.

131. PLEUROTUS (Fries) Quél. Champ. Jura Vosg. 77. 1872.

Putrescent, solitary or cespitose: pileus fleshy, somewhat irregular: lamellae decurrent: spores white: veil well developed, forming an annulus: stipe more or less eccentric, firm, fleshy or woody.

Type, *P. corticatus* (Fries) Quél. (Syll. 5: 339.)

This is *Pleurotus* § *Lepiotarii*, of the *Sylloge*. The other sections must be sought under the *Gymnophylli*. It differs from *Polymyces* only in the slightly eccentric stipe.

132. CHAMAEMYCES Batt. Fung. Hist. 32. 1755.

Mucidula Pat. Hymén. Eur. 95 (metonym). 1887. Type, *Armillaria mucida* (Schrad.). (Syll. 5: 85.)

Putrescent, solitary or cespitose: pileus fleshy: lamellae adnate, not waxy: spores white: veil forming an annulus: stipe central, slender, cortex subcartilaginous.

Type, *Armillaria fracida* (Fries). (Syll. 5: 86.)

This is *Armillaria* § *Collybiae-annulatae*, of the *Sylloge*. It is entirely probable that *Mucidula* Pat. represents a distinct genus, but the group requires more study.

133. POLYMYCES Batt. Fung. Agri. Hist. 34. 1755.

Armillariella Karst. Acta Soc. Faun. Fl. Fenn. 2: 4 (typonym). 1881.

Putrescent, usually cespitose: pileus fleshy: lamellae decurrent: spores white: veil forming an annulus: stipe central or nearly so, firm, fleshy or fibrous.

Type, *Armillaria mellea* (Vahl.). (Syll. 5: 80.)

This is *Armillaria* § *Clitocybe-annulatae*, of the *Sylloge*.

134. SPHAEROCEPHALUS Batt. Fung. Hist. 32. 1755.

Armillaria (Fries) Quél. Champ. Jura Vosg. 36 (metonym). 1872. Type, *A. ramentacea* (Bull.) Quél. (Syll. 5: 76.)

Gyrophila Quél. Ench. Fung. 9 (metonym). 1886. Type, *Armillaria bulbigera* (Alb. & Schw.). (Syll. 5: 73.)

Putrescent, solitary or gregarious: pileus fleshy: lamellae sinuate or adnexed: spores white: veil forming an annulus: stipe central, fleshy or fibrous.

Type, *Armillaria focalis* (Fries). (Syll. 5: 74.)

This is *Armillaria* § *Tricholomata-subannulatae*, of the *Sylloge*.

135. LIMACELLA gen. nov.

Putrescent, solitary or gregarious: pileus fleshy, viscid, discrete from the stipe: lamellae free: spores white: veil forming an annulus: stipe central, slender, fleshy, no cortex.

Type, *Agaricus delicatus* Fries, Syst. Myc. 1: 23. 1821. (Syll. 5: 70, as *Lepiota delicata*.)

This is *Lepiota* § *B. pilei cuticula viscosa*, of the *Sylloge*.

136. CYSTODERMA Fayod, Ann. Sci. Nat. Bot. VII. 9: 350. 1889.

Putrescent, solitary or gregarious: pileus fleshy, dry, cuticle granular with swollen vesicles: lamellae free: spores white: veil forming an inferior annulus attached below the middle: stipe central, slender, fleshy or fibrous.

Type, *Lepiota amianthina* (Scop.). (Syll. 5: 48.)
This is *Lepiota* § *Granulosae*, of the *Sylloge*.

137. FUSISPORA Fayod, Ann. Sci. Nat. Bot. VII. 9: 351. 1889.

Putrescent, solitary or gregarious: pileus fleshy, dry, glabrous: lamellae free: spores white: veil forming a medial or superior annulus: stipe central, slender, tubular.

Type, *Lepiota sistrata* (Fries). (Syll. 5: 50.)
This is *Lepiota* § *Mesomorphae*, of the *Sylloge*.

138. MASTOCEPHALUS (Batt.) O. Kuntze, Rev. Gen. 2: 859. 1891.

Vaginarius Roussel. 1806. Not *Vaginaria* Rich. 1805.

Putrescent, solitary or gregarious: pileus fleshy, dry, floccose or squamose: lamellae free: spores white: veil forming a superior annulus: stipe central, fleshy, often bulbous, peronate.

Type, *Lepiota cepaestipes* (Sow.). Fries, Hymen. Eur. 35. 1874.

This is *Lepiota* § *Clypeolariae* and § *Annulosae*, of the *Sylloge*. *Mastocephalus* Batt. Fung. Hist. 30. 1755, has no binomial species and is therefore excluded under the rules. The name however was taken up and properly published by Kuntze in 1891.

139. LEPIOTA (P. Browne) S. F. Gray, Nat. Arr. Brit. Pl. 1: 601. 1821.

Putrescent, solitary or gregarious: pileus fleshy, squamose: lamellae free: spores white or green: veil forming a movable annulus: stipe central, long, fleshy, glabrate.

Type, *L. procera* (Scop.). (Syll. 5: 27.)
This is *Lepiota* § *Procerae*, of the *Sylloge*.

140. CLARKEINDA O. Kuntze, Rev. Gen. 2: 848. 1891.

Chitonia (Fries) Karst. Hattsv. 482. 1879. Type, *C. coprinus* (Fries) Karst. (Syll. 5: 992.) Not *Chitonia* Moc. & Sesse. 1824.

Putrescent, solitary or gregarious: pileus fleshy, discrete

from the stipe: lamellae free: spores purplish-brown or black: veil forming a basal volva, no annulus: stipe central, fleshy, hollow.

Type, *Chitonia coprinus* (Fries) Karst. (Syll. 5: 992.)

Used as in the *Sylloge*.

141. LOCELLINA Gillet, Champ. Fr. 1: 428. 1878.

Putrescent, solitary or gregarious: pileus fleshy, discrete from the stipe: lamellae free: spores ferruginous or ochraceous: veil forming a basal volva, no annulus: stipe central, fleshy.

Type, *L. Alexandri* Gillet. (Syll. 5: 761.)

Used as in the *Sylloge*.

142. PSEUDOFARINACEUS Batt. Fung. Hist. 29. 1755.

Not *Pseudofarinaceus* O. Kuntze. 1891.

Volvarius Roussel, Fl. Calvados ed. 2. 59 (metonym). 1806. Type, *Volvaria volvacea* (Bull.). (Syll. 5: 657.)

Volvaria (Fries) Gillet, Champ. Fr. 1: 385. 1878. Not *Volvaria* DC. 1805.

Putrescent, solitary or gregarious: pileus fleshy, discrete from the stipe: lamellae free: spores pink or salmon: veil forming a basal volva, no annulus: stipe central, fleshy.

Type, *Volvaria gloiocephala* (Fries). (Syll. 5: 662.)

This is *Volvaria* of the *Sylloge*. This name was first used by DeCandolle for a lichen, and therefore is not available. There is doubt on the part of some as to what species was intended by Battara. O. Kuntze claims that it was *Amanitopsis vaginatus*, but LaPlanche identifies it as above.

143. AMANITELLA gen. nov.

Putrescent, solitary: pileus fleshy, squamose: lamellae free: spores white: veil adnate, breaking up into squamules on the pileus and base of the stipe, no annulus: stipe central, fleshy.

Type, *Amanita farinosa* Schw. Schr. Nat. Ges. Leipzig 1: 79. 1822. (Not in the *Sylloge*.)

These species are included under *Amanitopsis* in the *Sylloge.*

144. VAGINATA (Nees) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 601. 1821.

Amanita Pers. Tent. Disp. Fung. 63. 1797. Not *Amanita* Hall. 1768. Type, *Amanitopsis vaginata* (Bull.) Karst.

Amanitopsis Roze, Bull. Soc. Bot. Fr. **23**: 50 (typonym). 1876.

Pseudofarinaceus O. Kuntze, Rev. Gen. **2**: 867. 1891. Not *Pseudofarinaceus* Batt. (typonym). 1755.

Putrescent, solitary: pileus fleshy, glabrous or with thin volval patches: lamella free: spores white: veil forming a basal volva, no annulus: stipe central, fleshy.

Type, *Amanitopsis vaginata* (Bull.) Karst. (Syll. **5**: 21.)

This is a part of *Amanitopsis* of the *Sylloge.*

145. ROZITES Karst. Hattsv. 290. 1879.

Dryophila Quél. Ench. Fung. 66 (typonym). 1886.

Putrescent, solitary: pileus fleshy: lamellae free or at first adnate: spores ochraceous or ferruginous: cortina present, forming an annulus: veil present, forming a basal volva: stipe central, fleshy.

Type, *Pholiota caperata* (Pers.). (Syll. **5**: 736.)

The only American species known is *Locellina Starnesii* Peck. As this has both volva and annulus it cannot belong to *Locellina.*

146. VENENARIUS gen. nov.

Putrescent, solitary: pileus fleshy, squamose or densely pruinose: lamellae free: spores white: cortina present, forming an annulus: veil present, adnate, forming scales on pileus and base of stipe: stipe central, fleshy.

Type, *Agaricus muscarius* Fries, Syst. Myc. **1**: 16. 1821. (Syll. **5**: 13, as *Amanita muscaria.*)

This is *Amanita*, §§ 2, 3 and 4, of the *Sylloge.* The name refers to the well known poisonous properties of the type species.

147. LEUCOMYCES Batt. Fung. Hist. 27. 1755.

Elvela Batt. 1755. (Not *Elvela* L. 1753.)

Putrescent, solitary: pileus fleshy, glabrous or with thin volval patches: lamellae free: spores white: cortina present, forming an annulus: veil present, forming a basal volva: stipe central, fleshy.

Type, *Amanita coccola* (Scop.). (Syll. 5: 8.)

This is *Amanita* § 1, of the *Sylloge*.

GENERAL INDEX

GENERIC INDEX

Bulletin

of

The New York Botanical Garden

Volume V, 1906–1908

Members of the Corporation.

TABLE OF CONTENTS

NO. 15. FEBRUARY 13, 1906

NO. 16. DECEMBER 18, 1906

NO. 17 MARCH 7, 1907

NO. 18. FEBRUARY 8, 1909